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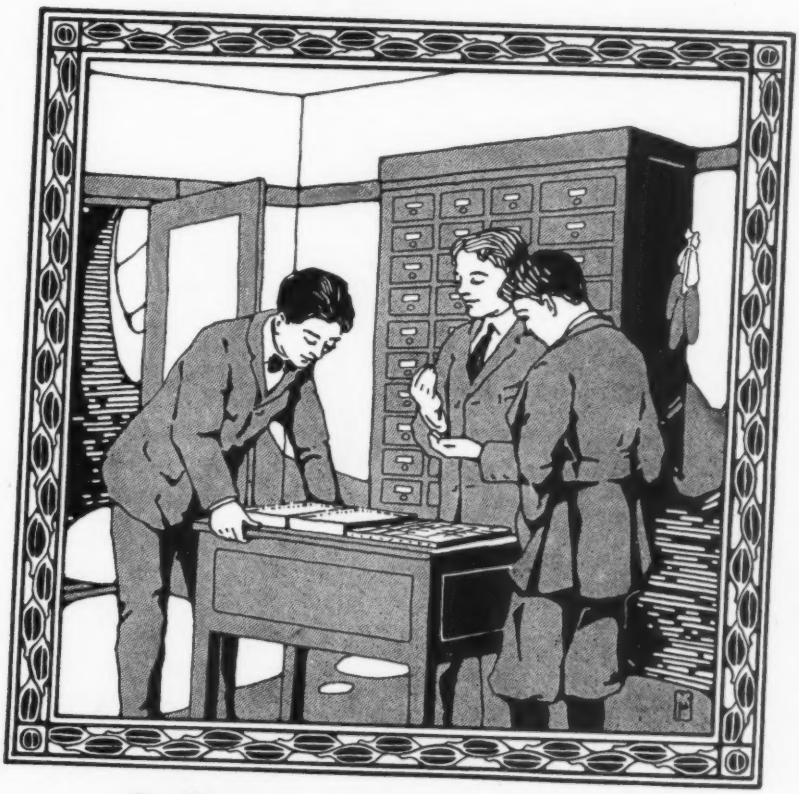

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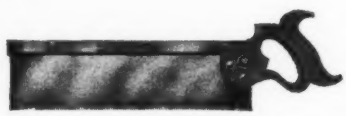

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INDUSTRIAL-ARTS MAGAZINE

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The Determining Factors in the Evolution of the Industrial Arts in America

A. B. Mays.

(Concluded from February.)

EDUCATIONAL experiments in the public schools have never been popular with the American public, and in the eighties and nineties it was more difficult than now to induce public officials to spend public funds for experimental purposes. It is not surprising then to find that manual training in the secondary schools was fairly well developed in private secondary schools before the first public high school offered such a course. Dr. Calvin M. Woodward, of Washington University, opened the St. Louis Manual Training School in 1880, and he is generally credited with having given to the type of work carried on there its name of "manual training". This experiment attracted immediate and widespread interest not only in America but in Europe. Dr. Woodward, who for some time had been one of the most vigorous and convincing advocates of such work in the schools, was now able to greatly strengthen his statements of the value of the work with concrete references to actual experiences in the St. Louis school. He made large and effective use of this weapon and largely through his efforts, the cause of manual training was advanced during the succeeding ten years with a rapidity which has seldom characterized educational reforms. His school had the further effect of diverting attention, in some degree, from controversial considerations of whether or not manual training should be taught, to methods of organization and instruction in the new field. In the development of new movements such a shifting of attention is often more effective than many carefully worded arguments. The St. Louis school was visited by a veritable stream of delegations and individual investigators, not only from numerous American organizations and public boards, but from similar groups in Europe. The powerful influence of this much-talked-about school can hardly be overestimated in its effects on the early development of manual training schools in the United States. Dr. Woodward published a number of books and magazine articles which were filled with illustrations taken from his work at the St. Louis school. These publications were reviewed at length and much discussed.[9] Even his English style and grammatical constructions were bitterly criticized by the slowly retreating enemies of the new type of education.

Very soon after the opening of the St. Louis Manual Training School, Dr. Henry Holmes Belfield, an educator of long experience in secondary-school administration and an outstanding advocate of manual training, was commissioned by the Chicago Commercial Club to organize the Chicago Manual Training School. This school was established in 1883 and till 1897, when it was presented by its founders to Chicago University, was one of the most influential agencies in the country for the advancement of high school manual training. Mr. Charles A. Bennett, in commenting editorially on this school and its principal says, "Dr. Belfield, with C. M. Woodward of Washington University, Dr. James MacAlister (at that time superintendent of schools in Milwaukee), Charles H. Ham and Col. Augustus Jacobson of Chicago, was a pioneer in the manual training movement and had many earnest and some unpleasant experiences in fighting the battle which placed manual training in the public schools. The Chicago Manual Training School was the first manual training school of high school grade not connected with a university, the only older school of this character being the St. Louis Manual Training School of Washington University."[10] In the same editorial Mr. Bennett says "Being one of the first representatives of a new type of school, its equipment, courses and methods were studied by thousands of visitors who came to its open doors. In this way it exerted a great influence in shaping the work in other schools. But if the Chicago school did one thing better than another, we believe it was this: it always stood for the highest scholastic attainment in addition to thorough work in manual training.***** It was this tenacious adherence to high standards of scholarship in Dr. Belfield's school that, at

[9]See, "Manual Training in Education." William H. Maxwell, Educational Review, Feb., 1891, pp. 194-196.

[10]Manual Training Magazine, Oct., 1908.

a critical time, turned enemies of manual training into enthusiastic friends."

During the decade of the eighties a number of manual training schools of secondary grade were opened under private auspices and they all made notable contributions to the development of this work at a most critical period in its history. The discussions of this period were heated and are of great value to the present day student of American education; for in them are to be found the roots of modern school problems and educational theories. Few of the issues raised at that time have been fully settled yet, notwithstanding the wonderful progress made since the opening of the new century. In 1884-1885 the Toledo Manual Training School was established. It was modeled after the St. Louis school. A report of its opening states,[11] "One great object of the school is to foster a higher appreciation of the value and dignity of intelligent labor and the worth and respectability of laboring men." "All the shop work is disciplinary, special trades will not be taught nor will articles be manufactured for sale."**** "The course occupies three years and includes a good range of science, literature and mathematics studies besides the manual training." The Hebrew Technical Institute of New York was also established at this time for boys from 12 to 15 years of age.[12] "Instruction is given in freehand and mechanical drawing, mathematics, physics, the English branches, wood-turning, wood-working, metal working and modeling in clay. Manual arts, not trades, are taught."

In 1884 there was established also the Baltimore Manual Training School which is probably the first fully equipped manual training school supported by public taxation. Two years later, in Philadelphia, there was established what is said to be the second public manual training school in America. Schools, both public and privately endowed, were established with increasing frequency during the remainder of the decade until in 1890 the establishment of public manual training schools and of departments in established schools became general throughout the country. The enthusiasm of school authorities for this type of work after 1890 is striking and the rapidity of the growth of handwork in the schools is one of the most remarkable phenomena in the whole history of American education. By 1887 leaders were urging the development of manual training courses in the elementary schools and this movement was rapid and continuous. The educational philosophy upon which the subject rested made its introduction into the lower schools very easy and the fact that most children never entered high school added greatly to the arguments with which this grade of work was urged.

Manual training found its way into the American schools at a crucial period in their history. Educators and publicists were keenly conscious of the inadequacy of the schools to serve a new and rapidly developing industrial civilization which possessed a new spirit of achievement and democracy, having little in common with the traditional standards of social and economic success. They were critical of both content and methods. Their study of the European reformers led to renewed examination of teaching methods but it was entirely natural that the great industrial activities of the nation should supply the materials for a change in the content of the curriculum. The fact that schoolmen insisted from the first that the new subjects were to be general in character with general educative objectives, caused stress to be placed on the idea of teaching all the school subjects to make them effective in the vocational life of the pupils. This idea, so often expressed in the discussions of the earlier years of that period, served to shift gradually the whole point of view of the schools and is perhaps of more significance than the mere introduction of a new set of subjects. It would be impossible to assess the full value of the contribution of manual training to American educational development in the past forty years, but no serious student of education fails to give it an important place among the great determining influences which have directed the schools of today.

With the close of the nineteenth century manual training was firmly established as an integral part of American public education. Pres. White of Purdue said in 1879 "I have little expectation that workshops will ever have an important place in the public schools, but I do expect to see public instruction have a more direct relation to industry."[13] He referred, of course, to trade training shops. But workshops were soon to have a very important place in the public schools. Dr. Haney[14] in 1911, stated that in 1890 there were 37 cities reporting some form of manual training; in 1894 there were 95, and six years later this number was almost doubled. The work is even yet constantly growing notwithstanding the fact that it has from the first had to fight almost every step of the way.

Redirecting Influences

One of the most interesting characteristics of manual training from the first has been its tendency to change its form. In some cases there have been marked changes in emphasis; in others, the very content of the subject has been altered, and always methods and course organization have been changing. This tendency toward improvement and away from stagnation has constituted one of its greatest elements of value to the schools and has made for it both its bitterest enemies and its greatest friends. One of the most interesting chapters in manual training history is that which deals with the reforms and influences which have developed within the subject itself, and which have made the best types of work of a modern high school so strikingly

[11] Proceedings N. E. A., 1885, p. 249.
[12] Ibid, p. 249.
[13] Proceedings N. E. A., 1879, p. 215.
[14] James Parton Haney, "Twenty-one Years of Manual Training," Manual Training Magazine, Feb. 1911, p. 225.

different from any work found in the great pioneer schools of Woodward and Belfield.

The type of work at the Centennial of 1876, by the Imperial Russian Technical School, became almost without change the type universally found in the high schools of America from 1880 to the beginning of the nineties. It consisted of a series of exercises in wood and metal, designed for their value in teaching "principles" of construction and in training in exactness in mechanical processes. The exercises were arranged, in a general way, on a difficult scale and all required very exact measurements and tool execution. They were essentially abstract and except for the fact that boys were interested in almost any sort of manipulative work, especially where mechanic's tools were used, they were usually uninteresting. Almost from the first, American teachers modified the "Russian System", as the work was called, so as to introduce some element of practical use, but for the most part the analysis of tool processes and the development of manual skill, with the attendant supposed disciplinary values involved in the making of the exercise pieces, were depended on to produce the great educational and industrial benefits claimed for such work. Much attention was given to elaborate analyses of tool processes and very extended discussions over the best methods of holding the chisel or the saw were common. The Russian System was enormously interesting to the shop pedagog and permitted the widest play of his powers of minute analysis of relatively unimportant matters. But after the novelty of the work disappeared the interest of the boys began to wane. The most beautiful theories not infrequently are badly upset by healthy, eager boys.

By 1885 manual training teachers were beginning to look for some way to make the work more interesting without giving up the acknowledged educative values in the exercise work. The ideas of accuracy, analysis of structural elements, and skill in tool processes are the great contributions of the old Russian system which have persisted through all the various changes to the present day. The obvious faults of the system were due, more than to any other cause, to the educational philosophy of the time which was fully committed to the general theory of formal discipline which in turn was based on the old psychology. It is not to be wondered at that such a method met such general acceptance but rather that it did not become more firmly fixed in the educational practice of the American schools than it did, for the idea of a standardization of method was very attractive to the teacher of the nineteenth century, as it often is today. The whole tendency of the times was toward formalizing and conventionalizing courses. In an enthusiastic article in "Education", February, 1888, on History and Economics in Manual Training Schools, Frances Newton Thorpe said: "We believe that manual training is a return to first principles and that experience will soon organize a course in manual work as conventional as the college course itself." But a new idea was introduced about the middle of the first decade in the history of manual training, namely, the idea that *interest* is important and that useless joints in woodwork and other exercise pieces are not interesting to boys.

In 1885 another big Fair was held, this time in New Orleans. It was the Cotton Centennial Exhibition and it also had an educational exhibit of much interest to American teachers. One report of this exhibition states "The remarkable slöyd work of Sweden was illustrated by a set of drawings of the Nääs models ****** and by about one hundred specimens of very nice woodwork made by boys from 11 to 15 years old, in the schools of Stockholm."[15]

This most interesting slöyd work was not wholly unknown to the American leaders in 1885, for the famous normal school of Herr Otto Solomon had been in existence since 1875 and teachers from all over the world were attending to learn this wonderful new school work. The story of Dr. Solomon and his great work in Sweden is well worth the study of any teacher. His system of handwork which was introduced into the Swedish schools with government aid in 1877 did not reach this country in any concrete form, however, till 1888 and it was well into the nineties before it was generally adopted by the public schools and then only in a modified form. In 1888 the Slöyd School of Boston was established and American teachers could see for themselves just what the character of the new type of work was. A very interesting discussion soon developed as to whether slöyd should be "adopted" or "adapted" and the final outcome was adaptation rather than adoption. Slöyd work consisted of a series of small models carefully planned so as to progress through a difficult scale of graded tool exercises. In Sweden such work was given in various materials, but it was almost invariably given as woodwork in this country. It had the advantage of being more interesting than the Russian system of shopwork because the boys were required to make "models" involving various exercises rather than to make only the exercises. But slöyd suffered from the inflexibility of its organization and the almost unvarying character of the models made. Like the Russian system, slöyd was too carefully analyzed and its various special values were too well measured and defined. Too little room was allowed for individual differences and there was, too, some doubt as to the exact benefits to be derived from its use. It very soon underwent so many modifications that its original character was lost and the "project" rather than the "model" appeared as the unit of course organization.

Slöyd was rather enthusiastically welcomed when it first appeared on the scene because it reached America just at the time when manual training was taking hold in the elementary schools and slöyd methods seemed to be peculiarly well adapted to

[15]Proceedings N. E. A., 1885, p. 525.

elementary school work. It required few tools, little equipment, had clearly no vocational significance, and it was well within the powers of elementary children. The appearance of slöyd in this country coincided also with what was perhaps the most significant period in the history of American education. It served as a transition type of work connecting the formal Russian work, which was based upon the old faculty psychology and the doctrine of formal discipline, with the later forms of manual training which attempted to express the new educational psychology and the new social philosophy of education. In fact, educational thought was so disturbed during the close of the century that it would have been remarkable if any type of school work could have survived unchanged.

Other influences contributing to the confusion of the period were the culture epoch theory which, while not new, was being re-emphasized, and in addition, the arts and crafts movement which came from England. The former of these affected principally the courses in handwork in the primary and elementary grades. The theory assumed that children reproduce in their life history from earliest infancy to maturity the race's history from its beginning to modern civilization, hence education, to be effective, must conform in its methods and content to the various stages of race history. Applied to handwork the theory would require that since small children normally do the things the race did in its earliest stages, the schools must offer for small children the types of work carried on by primitive peoples. As children develop toward maturity the handwork must change from time to time so as to correspond to the advancing periods of race history. Some of the discussions of that period even turned on such absurd considerations as, What tools did men use first, cutting tools or pounding tools, such as the hammer? Did man use a knife before he developed a saw? If the knife were the first tool used, then, of course, knife work should be taught before the use of the saw. Not many teachers were greatly disturbed over such arguments, but this type of thinking clearly indicated the unsettled state of educational thought.

The later arts and crafts movement had a more permanent effect on manual training work, and its influence is still great in all the practical-arts work of the schools. This movement arose as a protest against the ugliness and bad taste which characterized almost everything made during the latter half of the nineteenth century. Houses, furniture, pottery, even clothes were ugly. It is difficult to understand today how cultivated people of that period could tolerate the prevalent ugliness of almost everything made by man. William Morris and others in England, started a movement to restore the spirit of craftsmanship and art in the production of useful articles. Many societies were organized in England and in America. The movement spread with remarkable rapidity in this country and societies were organized in many cities to promote the movement. The movement itself completely failed because it attempted to revive the old guild methods of production. Such an effort was foolish in the face of the clearly defined trend toward more and more machine production. However, the attention of the nation was directed to the bad construction, and worse design, of most products of the trades and industries, and great interest was stimulated in art education throughout the land. The keynote of the movement for good design was simplicity and good proportion, and these two ideas coming into the shopwork at the time of the appearance of the project greatly enriched the later forms of manual training work. Shop teachers began to insist that the boys' work must not only be performed by approved methods with respect to tool processes, but must be well constructed, well adapted to use and beautiful in contour and proportion. It would be difficult to accurately evaluate this contribution to school work. It is safe to say that no single influence has meant so much in the enrichment of educational handwork, or meant more in the raising of the general level of appreciation of beauty in American every-day life.

The friends of manual training, while insisting that it was a part of general education and not trade training, had from the first also declared that it made an important contribution to the industrial education of boys. At times this idea was almost wholly suppressed but it continued to come to the front, and after the opening of the new century came again into much prominence. Various types of trade education had developed during the years in which manual training was in the forefront of educational discussions, and this trade work served constantly to call attention to the vocational shortcomings of such work. The shortage of skilled labor was apparently as acute as ever after twenty years of manual training notwithstanding Dr. Woodward's belief in 1903 that "by multiplying manual training schools we solve the problem of training all the mechanics our country needs."[16] During this period renewed agitation began for "real" vocational education for the trades, and the leading men in the manual or industrial arts field soon began to urge the vocational values of their work. This emphasis took the form of an insistence on "factory methods" in shop work. Soon the character of addresses and magazine articles dealing with methods changed their theme and everywhere the shop teachers were told how to organize the class in groups with a "foreman" over each group. Emphasis was placed on the proper routing of material through the shops, and group projects, rather than individual projects only, became the popular method of organization. The teachers were urged to make closer contact with industry, and factory excursions were held up as one of the most valuable parts of the course. Great emphasis also

[16] C. M. Woodward, "Manual Industrial and Technical Education in the United States." Report of Commissioner of Education. 1903, Vol. I, p. 1039.

was placed on factory methods of keeping records. This whole idea is clearly stated in Mr. Fred D. Crawshaw's book "Manual Arts for Vocational Ends", which was published in 1912 when the movement was at high pitch. He says, "Do all these things, which manual training has sought to do in the past, but do one thing more to take it out of what some have called the dilettante stage of development—make it *strongly industrial*. That is, give every shop process an industrial rating to evaluate in the child's mind the process in the industrial shop and a similar process in the school shop. Make the school process as closely as possible a duplicate of the commercial shop process, and still retain the educational values, mental, moral and all the rest, which the manual training of the past has claimed."

This phase in the development of industrial arts was also closely related to the movement which was then taking strong hold of American education, namely, the effort to relate more vitally the schools to the daily life of the people. Everywhere throughout the writing of the day are the words, "vitalize", "relate to life," "socialize". Thus again is seen the very vital relation industrial arts has always sustained to the growth of general education on the one hand and to vocational education on the other.

The renewed emphasis on the vocational values in industrial arts seems not to have materially affected the growing demand for definite vocational education for the trades and industries. In 1907, in New York City, an organization of schoolmen, manufacturers, bankers, and publicists was established to promote vocational education in America. This society known, at first, as The National Society for the Promotion of Industrial Education, was destined to have a very marked effect on industrial arts in this country. Later after enlarging its program to include other fields of vocational education, this organization was so effective in its work of propaganda as to be able to put through Congress in 1917 that most unusual piece of educational legislation known as the Smith-Hughes Law. This law passed during the stirring war period, has affected the whole educational situation as have few laws since the founding of the Republic. Notwithstanding that it has been in operation nearly six years, it is being more earnestly debated now than when it was before Congress.

In developing the propaganda work of the National Society for the Promotion of Industrial Education, many of its members seemed to think that it was necessary first thoroughly to discredit industrial arts in the eyes of the American public. While these attacks from powerful sources served to discourage many young teachers and caused a number of superintendents to consider the discontinuance of industrial arts in their schools, it also served to call to the defense of this work many strong advocates and produced what proved to be a most healthful discussion. Many teachers were led to re-examine carefully the subject and to restate in more definite terms the values and aims of industrial arts. It was found that it had profited by all the earlier movements and was a more valuable part of the curriculum than it ever had been. Without relinquishing its claim to great general educative value, it was no longer under the necessity of trying to show specific vocational values and, therefore, was able more clearly to reaffirm its general values and to state them in terms of a sound educational philosophy based on a modern sociology and a scientific psychology.

One of the most striking phenomena in modern education has been the constant expansion, not only of industrial arts itself, but of the whole range of ideas, for which through the years, it has stood. Up till now the whole movement for vocational education not only has not injured industrial arts but has greatly advanced it. It is safe to assert that never since 1880 has manual training or industrial arts had so firm a place in the American schools as now. The next ten years promise many interesting possibilities for this type of work. No one can see with certainty what the outcome will be but every element in the situation seems to indicate a still larger place for an enriched type of educational handwork.

Starting with exercises which required great accuracy of execution, manual training soon borrowed interest as a chief element from the Swedish slöyd. Carrying over the accuracy and interest to the American project, which called for broader industrial knowledge and greater powers of planning and thinking, it accepted the gift of the ideal of beauty, in line, proportion, and finish from the arts and crafts movement. From the "factory method" idea it got more modern machinery and a better shop organization as well as closer contact with the industries of the community. Finally, because of the efforts of the advocates of vocational education to show what industrial arts is not, it has been able to show more clearly than ever before what it is. It stands today as a vitally important part of American education, appealing to the interest of American boys, challenging their powers, developing their inventive and constructive abilities, and interpreting the industrial life of the nation to those who later are to control that life.

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Selecting the Job for the Boy

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THE scientific personnel director must be guided by facts—facts as to the qualifications of a boy for the job and facts as to the requirements of the job. Both are absolutely essential in any guidance program. Minds are not constant; they are continually changing. And it is well that they do change (or grow) otherwise we would not progress. What pleases one this week may displease one next week. Jobs are more constant than minds but they, too, are constantly undergoing changes in requirements for their performance.

One can be educated to like a job that at first he hated. Education changes one's likes and dislikes. Each occupation requires the training of a certain quota of men to work in that particular one. Industrial society is made up of different groups possessing characteristic inclinations, tendencies and desires. Shall we figure out the proper proportion of individuals needed to carry on the essential occupations and then proceed to select certain individuals for certain occupations, educating them to fit into certain niches? Shall we place the boy where his training qualifies him to be? Yes! Shall we break away from the old idea of naturalistic tendencies and adopt a process of placement that will be of most direct economic benefit to the nation and to the boy? By so doing we may control the destiny of man and of nations.

Intelligence tests could be utilized to help rate a boy as capable of performing certain tasks requiring a certain intellectual pre-requisite. These pre-requisites could be worked out for each occupation. Naturally enough we would find the great majority of individuals possessing an "average" or "normal" amount of inherent intellectual capacity. This larger group would supply the mechanics, machinists and the workmen for those occupations requiring more mechanical hand labor, while those rating high in intelligence would supply the professions and the executives in business. Does it not seem strange that we have such a well balanced economic strata? It is not exactly true, however, that the numerous different dispositions (likes and dislikes) of men harmonize exactly with the numerous different fields of labor. Yet this mass of workers must be dove-tailed into the labor situation with a nicety which will bring about satisfaction and happiness to all concerned. In general we find people satisfied with their job, in itself, but complaining about the wages. There seems to be a need these days for a selective developmental urge which will place the individual in the proper job and be sure that he will enjoy it. It would be futile to classify an individual as belonging to a certain group of occupational workers upon mere intelligence alone. Tests are needed to examine the "creative imagination" of the individual.[1] We must supplement these tests by courses designed to educate an individual of a certain mental level to fill one of the several occupations which require that certain amount of intelligence. Educational prerequisites should also be calculated. We could then say that a very intelligent and well educated boy, possessing a wealth of creative imagination, should be placed in a profession or an executive position in business. In fact that is where they generally go as a natural sequence of events. The percentage of workers in any given field is a good indication of the intelligence required in that given field. In general we might say that the intelligence required varies inversely with the number of individuals in that occupation. For instance there are 30.8 per cent of all workers in the United States in the manufacturing and mechanical industries while there are only 5.2 per cent in the professional field. The professional field is acknowledged to require more intellectual capacity than that required in the mechanical field.

Native intelligence, education and creative imagination then are three essential criteria in our placement procedure. We must not cast aside the likes and innate dispositions of the individual but must ever bear in mind their transitoriness. Education, plus native intelligence, shapes the likes and desires of the individual in making a choice. The "find yourself" idea seems to be emphasized at present. Too many guidance directors are content to accept this in toto. In the final analysis, the young man must "find himself" (using the term in a much more restricted sense) but we should not overlook our full responsibility in the intelligent direction of the individual before this time of choice comes, otherwise our whole guidance program is useless. The main trouble with the "Find Yourself" idea (per se) is that too often the individual finds himself in the wrong job.

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[1]Simpson, R. M., Creative Imagination, American Journal of Psychology, Vol. 33, April, 1922, 234-243.

The fallacy underlying present attempts at guidance in vocational selection lies in the acceptance of the untrue belief that innate instinctive tendencies are unchangeable and uncontrollable. We are prone to bow to heredity and instinct. Intuition is stripped of its cognitive aspect. Intuition, however, is merely one of the three aspects of suggestion (mimesis and sympathy being the other two).[2] Suggestion is merely an outgrowth of the gregarious instinct. All individuals are acted upon and react to suggestion. If, then, one's "calling" is a matter of intuition and suggestion we are dealing with something which is plastic, since it is in the main an acquired disposition. This is contrary to the old accepted belief. We might go a step farther and say that even instincts change. Such an eminent authority in the field of psychology as E. L. Thorndike makes the assertion that, "Transitoriness is a fact; instincts do wax and wane."[3] Collective childhood reasoning based upon youthful experience (erroneously termed instinct by some) is the main directive urge carried over from childhood to aid the young man in his choice of a career.

If personnel direction is to be efficient it must be active not passive. The director should possess a thorough knowledge of psychology and apply this knowledge in the solution of his problems. The correlation between mental tests and tests for mechanical aptitudes should be studied more thoroughly and utilized.

The uninterrupted sequence of natural selection in the choice of a vocation seems to lead to economic destruction. At present, for instance, there are 51.4 per cent of the people of the United States living in urban territory (1920 census) while in 1910 there were only 45.8 per cent residing in cities of 2,500 or over. If this state continues what will become of the farmer? In our investigation of the schools of Joliet we found only 27 would-be farmers out of 694 boys. Even in such an industrial city this percentage is amazingly small. This condition must be stabilized by the personnel director. It involved the development of a working technique designed to supply the demand for workers in the various occupations.

It is a common occurrence in every-day life to see that men "switch off from one occupation to another of a very different kind, and are in no way disturbed by impulses or memories proper to the occupation which has been given up in favor of another.[4]" There evidently is a "tide in the affairs of men" which should be taken at the "flood". We must take the "current when it serves." In the changing of occupation we see the graduated control of instinctive tendencies by needs which have been brought forth by advanced mental life. In the words of Bernard Shaw, "Take care to get what you like, or you will end by liking what you get." Development is marked by change. Happiness is impossible without media for change. Satisfaction is a good indication of fitness for any particular work. But change involves economic loss so we must strive to place the boys in the right occupations at the outset. Change can be forestalled by the manipulation of the likes of the boy. Past desire for change and future anticipation for change should be combined with present likes to bring about a correct judgment as to the choice of a vocation.

Münsterberg points out some of the individual differences for which one should look in comparing the boy and the job. For instance, there are some boys who naturally assume responsibility and others who evade it; the directive and the dependent boy; the original and the imitative; the easily adaptable and the self-centered; the accurate and the inaccurate, and those rapid and slow in mental coordination. "Some are deliberate at their work and some impulsive."[5] The cumulative record of a boy for a period of four or five years offers the best basis for a psychological study of likes and dislikes. But likes and dislikes do not always harmonize with capacities! Physical aptitudes must be considered along with mental inclinations.

A group of 694 boys in the public schools of Joliet were asked to "write down in as few words as possible, what they thought they would like best to do when they became (big) men. There were 101 different occupations chosen by this group of boys ranging in age from 7 to 15 in the third through the eighth grades. Out of the 694 choices we found the following distribution of the six highest choices: 126 machinists and mechanics; 124 engineering (including 10 civil, 14 electrical, 39 mechanical, and 52 railroad locomotive engineers); 34 lawyers and 34 doctors; 27 farmers and 27 carpenters; 21 electricians (not included in electrical engineering); and 19 plumbers. In all of the grades, from the third through the eighth, we found this order of choices. We also found the same order of choice in the ninth grade in the classes in "occupations" in the high school. Electrical engineering which we included in the field of engineering, was chosen by 43 boys. If we substract these 43 from the 124 choosing engineering, and add the 43 electrical engineers to the 21 listed in the field of electricity, we get a total of 64 boys in the electrical field. This places electricity in third place as to rank. It is interesting to compare this order of choices with the findings of the United States census report for 1920. In the federal report on occupational statistics we find that there are 30.8 per cent in the manufacturing and mechanical industries; 26.3 per cent in agricultural pursuits; 10.2 per cent in trade; 8.2 per cent in domestic and personal service; 7.5 per cent in clerical occupations; 7.4 per cent in transportation; 5.2 per cent in professional service; 2.2 per cent in the extraction of

[2]Rivers, W. H. R., Instinct and the Unconscious, London, (1920) p. 93.
[3]Thorndike E. L., Educational Psychology, Vol. I, p. 115.
[4]Rivers, W. H. R., op. cit. P. 82.
[5]Münsterberg, Hugo, Psychology, General and Applied, New York (1914), p. 417.

minerals, with 1.9 per cent in public service. The two seem to harmonize nicely with the exception of the doctors and lawyers in Joliet. If we placed them last we would have identical sequence in our proportions. Under our arbitrary placement scheme as outlined above we would have to examine these prospective doctors and lawyers to make sure of the place where they belonged. As for the machinists, mechanics and engineers we would let them rest in comparative peace as far as the economic requirements of the community are concerned. But some of the boys may change their minds about the earlier choice of an occupation while others will leave Joliet. Since we found the same order of choices in all of the grades, it becomes evident that it makes no difference in the proportion if we do have many changes due to shifting likes and dislikes. If modern progress and invention change the requirements for workers in different proportions, then we must change the curricula of our schools and train the boys to fill the newly created positions in the proportions demanded. It seems to be a very dogmatic and mechanical scheme at first glance so the new objective of the school should be to create within the individual a social disposition, which will harmonize with his training or ability.

The evidence seems to prove that we do not have the transmission of acquired occupational characteristics through inheritance. The percentage of boys choosing their father's occupation seems to disprove this. It is further proven by the percentage that admit they were influenced by kith and kin. In a group of 52 boys in the ninth grade six said they had been influenced by their father in making their choice of an occupation; seven by their uncle; eight by their brother; ten by a friend; two by a cousin; two by their mother; and one by his grandmother. Three chose the work alone because it appealed to them. None said their teachers had influenced them in making their choice. The remaining thirteen failed to respond. Thirty-six out of the 52 boys, or almost 70 per cent of the choices, were influenced by outside environmental factors. Likes change through response to environmental necessity. Necessity seems to be one of the important factors in the shaping of occupational environment.

In "The Republic" of Plato we find Socrates telling Adeimantus that "no two persons are born exactly alike but each differs from each in natural endowments, one being suited for one occupation, and another for another." If this were absolutely true there would be as many different occupations in the world as there are individuals, provided each individual followed his innate endowments. Would Socrates maintain that the 130,265 musicians in this country differ from each in natural endowments? Since man's choice of work is limited to a few hundred different occupations and there are 1,664,067,111 individuals on this earth, it follows that there will inevitably be groups of individuals possessing natural endowments which fit them as groups for certain occupations. Differences in temperament, individuality and personal traits are to be found in every individual but we must be careful to avoid sweeping statements as to natural endowments for an occupation. At present we are placing too many limitations upon the requirements for the different occupations. When these "natural endowments" come into contact with the external environmental world and undergo the restraint of the school they are changed and transformed. The infant is a bundle of instincts but the boy of 14 has subjugated certain of these instinctive tendencies and exaggerated others, to satisfy his own mental conception of happiness and well-being as shaped by the social life about him. We have no purely occupational instincts. Choice of an occupation depends upon environmental factors rather than upon inherited predispositions.

In 1910 there were 23,422 machinists, millwrights and toolmakers in Chicago. In 1920 this number had increased to 40,298. Possibly most of these additional men were supplied through shifts from other pursuits, while the remainder came from the ranks of young men just entering upon their career. The rapid development of automotive transportation is one of the chief causes for the increased demand for this class of workmen. "Natural endowments" may have placed these men in these positions but common-sense observation seems to show that economic necessity was in the main responsible. The workers in these fields seem to be contented and happy with their lot. Natural endowments inherited from their parents would direct their interests towards horses and carriages rather than to the mechanisms of automobile engines. The personnel director must be a keen student of our rapidly changing environment. His second chief concern should be directed toward the study of the emotional likes and dislikes rather than to the purely instinctive nature of the boy.

Discrimination is directly proportional to the amount of education the boy has acquired. This is clearly shown by the number of occupations chosen by by the 694 boys in the different grades in the schools of Joliet. The choice of the older boy is selective while that of the younger is imitative. We find many prospective movie-actors, policemen and firemen in the lower grades. The younger boy does not have the experience necessary to make more basic comparisons. Discriminations are made through comparisons. In the lower grades the boys choose the more common types of labor. In a group of 125 boys in the third, fourth and fifth grades we found none interested in becoming advertising experts, architects, business men, cartoonists, chemists, draftsmen, engravers, florists, linotype operators, manufacturers, missionaries, navigators, pattern makers, pharmacists, senators, scientists, stenographers, sur-

geons and upholsterers. We found all of these occupations mentioned by a similar group of sixth, seventh and eighth grade boys. Environmental factors undoubtedly broaden the boy's mental horizon.

High School courses in "occupational information," which are generally required of all freshmen, offer the boy an opportunity to scan the advantages and disadvantages of several hundred different occupations. This places the boy upon a pinnacle where he can view the whole field of work. It is just at this stage, too, that a great danger is encountered from hasty judgments in selecting an occupation which at the moment seems very fascinating. Here our present system of guidance is ineffective. We allow too much drifting. The boy should be led into the field for which his intelligence, environmental conditions, and special aptitudes have fitted him. Passé personnel directors should be supplemented by active teachers of occupational information who have the initiative and knowledge gained by direct personal contacts in the classroom. Many classes in "occupations" are jokes because the teachers lack strength in their convictions—or perhaps they lack the convictions.

Effective guidance gives the boy a developmental urge. If perchance he is pushed into the wrong occupation in his first year in high school he has three remaining years of high school life with its wide variety of contacts to show him the right way. A selection in the freshman year supplies the basis for a fine comparative judgment. The economic aspect of work has not yet seized him with its mighty grip. If vocational guidance is of any value, we must set aside theorizing and really tell the boy what he is best fitted to undertake as his life's work. In fact, it would be a splendid thing to have the whole faculty give their judgments to the personnel director and he then could summarize the report and find support for his final advice. Mr. J. V. Hanna, head of the Personnel Department in Joliet Township High School, has prepared individual record sheets which are to be given to each teacher having the individual in their classes. These teachers rate the individual upon his scholarship, application, ability to organize, punctuality, accuracy, aggressiveness, social qualities, distribution of time, etc.

We must go beyond giving the boy occupational information and then permitting him to choose for himself. If he chooses for himself so much the better, but there are many boys who lack the essential virtue of being able to choose wisely for themselves. Give the boy the benefit of your judgment. Some will say that this robs the boy of the initiative of forming judgments for himself. It is an old but true adage that, "two heads are better than one," in forming any judgment. If the boy loses in initiative he gains in the quality of his judgment. His further judgments are strengthened and stabilized by having a basis from which to reason. We are all influenced in our judgments. In the words of Lamb: "The measure of choosing well is whether a man likes what he has chosen." Changing one's opinion is the strongest type of judgment. So if the boy is convinced he should set aside a jumble of opinion for a single decision, he is really strengthened by the changing of his own judgment. Selecting of an occupation involves choice. Choice is an intellectual process. Intellectual processes are acquired.

Instincts are selective. If we believe in heredity we should believe that the boy must have certain inherent inclinations possessed by his father. This, however, is not true with regard to the choice of occupations of boys in the grades and in the high school. Out of 694 boys questioned in the Joliet public schools, there were only 11.53 per cent who chose to follow in the footsteps of their fathers. We questioned 67 boys in the fourth grade, 91 in the fifth grade, 78 in the sixth grade, 190 in the seventh grade, and 247 in the eighth grade. Out of these groups we found 18.1 per cent of those in the fourth grade choice their father's occupation, 10.3 per cent in the fifth grade, 16.0 per cent in the sixth grade, 7.7 per cent in the seventh grade, and 10.1 per cent in the eighth grade. From these figures we may conclude that different grades and ages do not seem to affect the percentage of those choosing the father's occupation. In the fourth grade, however, we have some evidence that parental influence is a little stronger than in the higher grades. Most fathers never advise their sons to go into the same line of work that they follow. The idealistic hope of what they would do if they had to go through life again is thrust upon the son, and talked into his system by father and mother. Even then parental influence is not as strong as the influence exerted upon the boy by kinfolks and friends as noted elsewhere in this article.

Vocational guidance is a new development forced upon us by the tangled skein of economic necessity. Vocational education has followed upon the heels of the guidance movement. If we have guidance we must have a selective educational curriculum. At present, all the emphasis seems to be placed upon shop courses in industrial pursuits, while other fields are neglected. Education is a training for life with its complexity of social adjustments. The complete education must fit the boy for vocational adjustments and prepare him for the special field for which he is adapted. The whole field of vocational education, with its multitude of shops and laboratories, depends upon the functioning of a successful vocational guidance program. We must first ascertain the boy's likes and dislikes and then place him in the proper shop.

If our teaching of occupational information brings forth dominant likes and dislikes in the individual, it will give the teacher a direct and basic clue to the field in which special encouragement should be given.

Gear Design in the High School

V. L. Sherman, Lewis Institute, Chicago.

TO begin this paper with a hyperbole: Geometry should be taught in the drafting room and design in the mathematics class. Curves in mathematics are of exceeding value to the mechanical student, and his chances of intimate acquaintance with them after leaving high school are slim. One of the curves in elemenary drawing is the rectangular hyperbola which, without explanation, is a vague slice. Give the student a short explanation of the steam engine indicator card and a point of cut off with pressure, and watch him realize on Boyle's law, $P \times V = C$. And then see him prove it as in Figure 1. The hyperbola will stick. Or have him lay out a parabola as in Figure 2, and he will have a better notion of acceleration.

A little while back, in an evening class in gear drawing, a solution was developed for the radius of a helix. One editor to whom it was submitted returned it with the remark that it might be over the heads of the ultimate consumers. A professor of mathematics ventured the remark that the proof of approaching a limit was rather avoided in high school work. An eastern trade paper took the solution, and it went back to its originators, shop men. Are the principal curves in engineering to be left out of a high-school boy's training because he hasn't reached a supposed mental capacity?

This involution is merely to suggest that gear design be taught in the high school, and that it be made use of by the department of mathematics in the way of problems and as a stimulant for teachers. Gearing has become such an important part of the machine

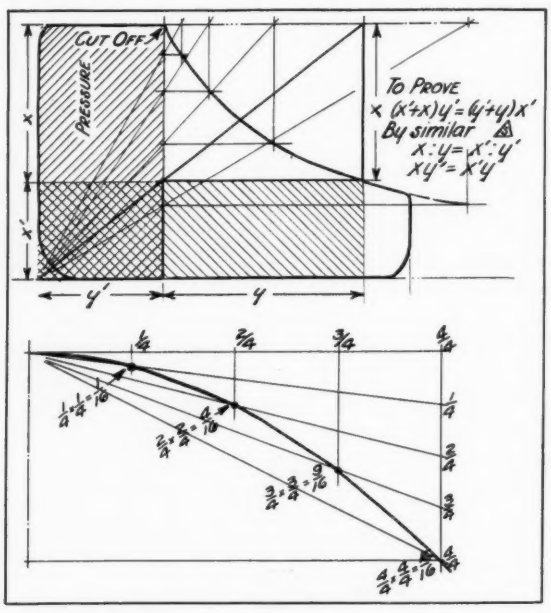
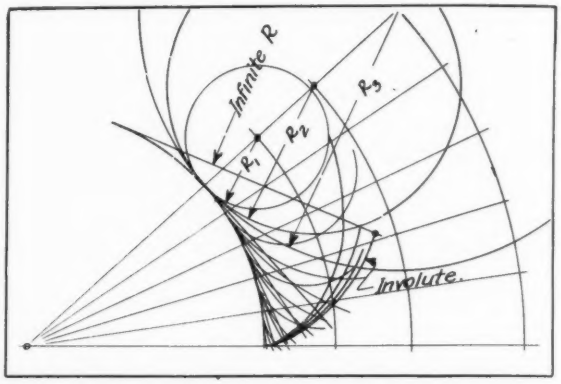


FIG. 1—TOP. FIG. 2—BOTTOM.



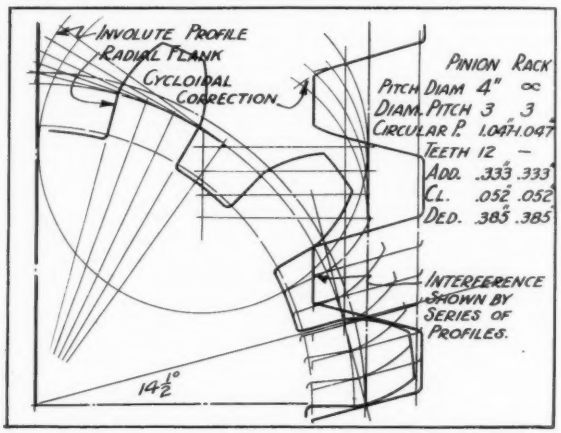


FIG. 3—TOP. FIG. 4—BOTTOM.

industry by its rapid improvement and growth of production that its importance cannot be overlooked. The last issue of one trade paper contained a list of more than thirty cut gear specialists in its advertising index. Lack of knowledge in the shops, and possible abuse of improved machine tools, may have something to do with the turning of work to the specialists. But shopping out work is not always the relief it seems. A large washing machine company received complaints that their transmissions were short lived. On investigation they found that a slight discrepancy in pitch had been made between the two gear cutting firms. The whole output was gone. Noise in an electric drill led to the broach for an internal gear. The broach was made by an outside tool company, and that was that. Many manufacturers would be vastly pleased if they could take their first problems to their own men for solution, but the average do not attend college, and few get to trigonometry or beyond, and have little knowledge of the curves of mathematics.

This approaching zero or infinity as a limit means much as an idea. Its effect is so apparent in gearing that an example can be made. In general it is said that there are two kinds of curves used in gearing:

The older, or cycloidal, is used to generate teeth where close contact is essential and there is no interchanging of gears. Geared pumps for heavy fluids are developed from the epicycloid and the hypocycloid. But since the least increase in the distance between the centers of the gears will spoil the contact, and because a cycloidal tooth is double curved and calls for more stock cutters, the involute curve has become universal. Now, we may represent the involute curve by using a base circle and an unwinding string. If we start with a generating circle for an epicycloid and increase its diameter, it will be seen that if the generating circle is increased in size the epicycloid apparently becomes a spiral, and when it reaches the theoretical infinity in size, the epicycloid has become an involute. This is shown in Figure 3.

The standard involute tooth has long been drawn from a base circle taken at a 14½° tangent. The smallest number of teeth allowable in a gear is twelve. With that number of teeth the involute will reach only a comparatively short distance below the mid-point, and from this point in toward the center a radial line is used. But if the opposing gear or a rack engages the pinion below the base circle, interference develops because the radial line is not an involute. For the correction we may use this solution: A radial line within a circle may be generated as a hypocycloid, if the generating circle equals half the diameter of the outer circle. This same size generating circle when used on opposing gears will bring the necessary correction, insure contact and eliminate interference. Here the element of motion can be introduced to show the interference. Notice Figure 4.

When the various speed ratios of the gears in a planetary gear set are brought up for solution, there is the greatest danger in computation. Usually the student feels as though he had wheels in his head. But the planetary gear train can be used very simply and very satisfactorily as a problem in ratio, and as a good demonstration of the various types of lever. The tooth of the fixed gear is the fulcrum, the tooth of the driver is the power, and the center of the driven gear is the weight, as in Figure 5. The speed is according to the type of lever. Other types of levers are obvious.

In shaping the teeth in a bevel gear, we assume that the gear is not a solid piece, but that it is made of an infinite number of laminations. Each turns about its own center, engaging with its mate in the opposing gear. The series of laminations implies a conical form of tooth at the instant of contact. From the number of teeth in these imaginary spur gears, we determine the shape of the tooth. As a lesson in triangles, proportions of similar triangles, and elementary work in angle function, the bevel gear is very adaptable. Again, to show the generation of a curve from innumerable straight lines, and to show the cone formation, a brief description of the action of a Gleason shaper is profitable.

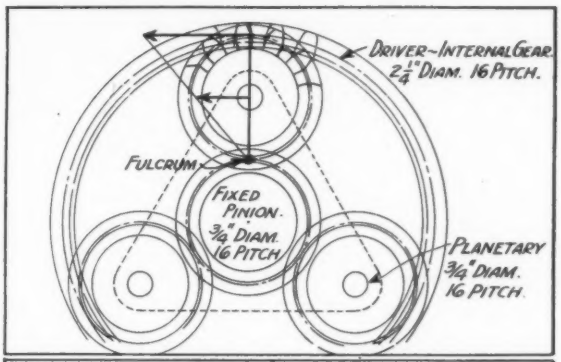


FIG. 5—TOP.

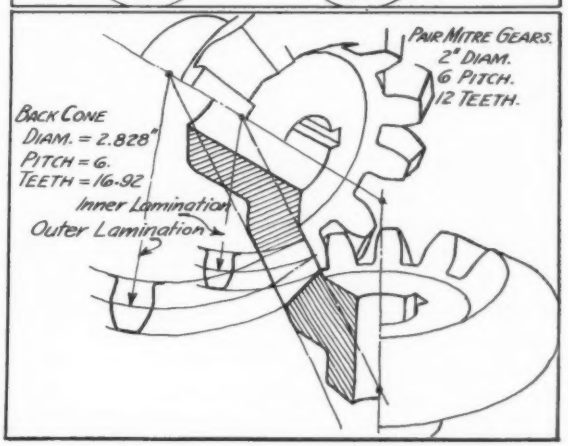


FIG. 6—BOTTOM.

Single, double, and triple threaded worms with worm gears are excellent for work with the helix. The worm gear drive for auto-trucks is common enough to allow an old one for a model in almost any school. Hyperbolic slices from the worm can be cut in the machine shop and the resulting curves used as templates in the pattern shop in laying out worm gear teeth.

But for real sport in mathematics try the helical gears. To the uninitated, the helical gear and its computations are a sort of maze. But, with a little patient thought and remembrance of the qualities of ordinary gears, a great deal can be realized, and many typical examples found for trigonometry of the earlier stages. If an ordinary spur gear is considered, it is seen that the engagement between the teeth is a matter of tooth profile. In a gear, cut so that the teeth are helical in form, the contact is spread. In a spur gear the resistance between the teeth comes in a plane perpendicular to the axes. In a helical gear the resistance develops a pressure along the plane of the axis. In a herring-bone, or double helical gear, these side thrusts are balanced. But, to get back, the helical or spiral gear must contain a whole number of teeth. The shape and size of the tooth, and the number of teeth are controled by another whole number. This is called the diametral pitch normal. The speed ratios are dependent, as in ordinary spur gears, on the number of teeth in the gears but unlike the spur gears, they are not

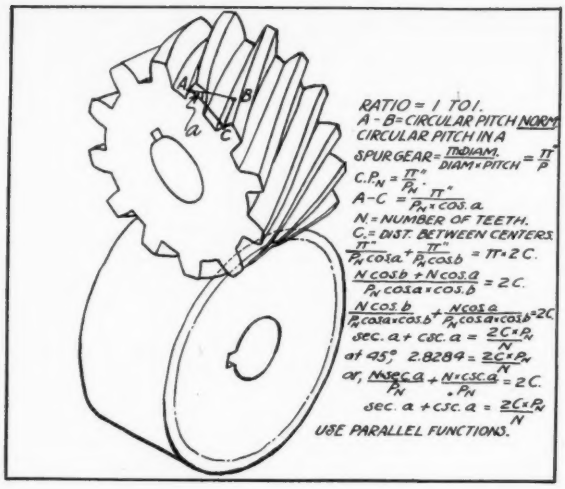

RATIO = 1 TO 1.
A - B = CIRCULAR PITCH NORM.
CIRCULAR PITCH IN A
SPUR GEAR = $\frac{\text{TH DIAM.}}{\text{DIAM} \times \text{PITCH}} = \frac{\pi''}{P}$
$C.P_N = \frac{\pi''}{P_N}$
$A-C = \frac{\pi''}{P_N \times \cos. a}$
N = NUMBER OF TEETH.
C = DIST. BETWEEN CENTERS.
$\frac{\pi''}{P_N \cos a} + \frac{\pi''}{P_N \cos b} = \pi \cdot 2C.$
$\frac{N \cos b + N \cos a}{P_N \cos a \times \cos b} = 2C.$
$\frac{N \cos b}{P_N \cos a \times \cos b} + \frac{N \cos a}{P_N \cos a \times \cos b} = 2C$
$\sec. a + \csc. a = \frac{2C \times P_N}{N}$
at 45° $2.8284 = \frac{2C \times P_N}{N}$
or, $\frac{N \sec. a}{P_N} + \frac{N \times \csc. a}{P_N} = 2C.$
$\sec. a + \csc. a = \frac{2C \times P_N}{N}$
USE PARALLEL FUNCTIONS.

FIG. 7.

dependent on the diameters. The possibility of increasing or decreasing the number of teeth in a gear, and with it, its speed, by decreasing or increasing the angle at which the tooth is cut, makes the figuring of helical gears very engaging. Figure 6 shows some possibilities.

There is more to gear design than can be touched upon in this paper. Gear design is today about as live a subject as any engineer can tackle. That is one of the first reasons that might be suggested for including gear design in high school work. While the graduate may never be a Phi Beta Kappa, it will be nearly as well for him if he knows the a b c's of mathematical forms through real contact. His college friend may learn the alpha beta's.

Returning to the early statement that one solution of the helix diameter is first propounded in evening school, isn't it a fact that for men unaccustomed to think in the abstract, algebra and geometry are more or less difficult? And isn't it true also, that for most of us, anything beyond geometry of the simpler orders is hallucination? And why is it that no more difficulty is encountered in dealing with such problems before untutored shop men than with high school graduates that lack shop experience? Because, through daily contact with all of the physical phases of mathematics, these shop men have little trouble in drawing from their imagination, while the theorist in mathematics can only draw on his imagination to the small limit of his classroom experience. The mind of the shop man steps up like the voltage in the secondary winding; the theorist hasn't any secondary winding.

The suggestion of gearing as a correlater of the branches in mathematics, does not imply a narrow field of mechanical similes. It is merely that gearing is likely to be close to a boy's mind and a welcome, as well as a profitable example. And it will introduce him to curves that are of infinite help to him later.

The Printing Instructor

C. W. Hague, Menomonie, Wis.

THE real key to success in printing school instruction is the type of man in charge of the work. No matter how elaborate the equipment, or how effectively the work has been organized, the course will be a failure unless the instructor has an adequate knowledge of his subject and can "put it over." This is, of course, assuming that the instructor is allowed to exercise his ability as an instructor, and not as a productive agent for the school in which he is employed.

Before coming to the particular qualifications sought in an instructor of printing, it may be well to dwell upon the general traits and characteristics that are desired; those of the man himself, and those things which should be predominant in every teacher. First, he should be a reputable citizen in the community in which he is serving, for without this he cannot be expected to develop manhood and good citizenship on the part of the pupils under his influence. Second, he must have a sympathetic understanding of the characteristics of the boys, both as pupils and in outside life. Two boys of the same age and ambitions may be entirely dissimilar in habits and disposition and may require two distinct forms of management. It must be realized that the mind becomes more serious with maturity and that the boy's standards cannot be measured by the instructor's ideals. Third, but possibly of first value, the instructor must have a liberal education of a general nature before even attempting to qualify as an instructor of any specialized subject. It may be said that no printer can ever be called illiterate, in view of his understanding of the printing trade, but from an instructor much more than the bare technical culture is expected. He must not only be able to speak good English and apply it in his work but he must also be able to tell *why* it is used, based upon the common rules of grammar and composition. He must not only be able to show the learner that a given size sheet of paper can be cut into so many desired sheets but he must be able to prove mathematically that he is correct. He should at all times have the power to instill in the boy's mind the finer sense of art back of the mechanical composition of type characters constituting a job. Finally, he must build the boy's mind, so that whether or not he follows the printing trade, he will have gained intellectual value for the time he has spent.

Turning now to the things more directly concerning the training of the teacher of printing, we may discuss them under three heads: The school-trained

man, the shop-trained man, the shop-trained man with teacher-training.

The School-Trained Man

Of the three above-mentioned types of training, possibly the school-trained man is the least popular as an instructor of printing. This is probably due to the fact that the extent of practical work in the school is inadequate to properly equip the man with all the knowledge necessary to teach the complete printing trade. It is probably due to the fact that the usual short course, which involves much professional training in addition to the shop practice, does not allow ample time to develop the trade skill expected of the instructor. Or, it may be that this type of instructor is denounced at the beginning by the neighboring craftsmen, and the instructor is not given a fair chance to develop.

By a school-trained man is here meant a man who has entered a teacher-training institution which is fully equipped with a print shop and an instructor capable of training the man to teach and perform the duties of printing. It is usually an institution of collegiate grade, the teacher enters an institution where the applicant must prove a high school education before being accepted, and where the proper emphasis is placed upon the professional as well as the technical phase of training.

In an institution of this kind it has been found by experience that it is possible to develop instructors of printing for junior and senior high schools, and even vocational schools, who are successful in their initial positions. This is not always the case, however, because as in every other profession, many men do not claim success until they have had several years of actual experience. In this particular case, it is even more difficult than commonly considered, because the candidate has a double field to master, that of knowing his vocation, and that of teaching it.

A great deal toward the success, or failure, of a school-trained man rests with the institution in which he is trained. At the beginning when the man enters such an institution, without previous trade or teaching experience, he is not in a position to know what he is best suited to teach. He must try a variety of trade courses, each of which will give him a satisfactory understanding of the nature of the work. This, on the face of it, may appear like a waste of time but it has been proven, that the majority of those taking such try-out courses "find themselves" only after becoming familiar with some new line of work. It is also much better for the man to have proven to himself which kind of work he is most adapted for in order that he may devote his best efforts to his future career.

It is conceded that the best printers are those trained in the so-called "country offices" where opportunities are greater for becoming familiar with the largest number of operations. This kind of training is especially desirable in a try-out course of printing, because it gives the learner an opportunity to become familiar with the large scope of the printing trade. Then, having become acquainted with the various occupations of printing and their relationships, he is prepared to know whether or not he is desirous of specializing in these occupations with the aim of becoming a teacher of printing.

In the courses which follow, he may specialize in composition, stonework, presswork, machine composition, and any other phases of the printing industry which the shop is equipped to teach him. Due attention should be given to the organization of both shop and technical information, with emphasis on the manner in which the work is presented, commonly known as teaching methods. He must also be informed on how to order supplies and equipment, and how to care for the shop.

The professional courses usually parallel the shop courses. In these the learner becomes thoroughly acquainted with the tools and methods of most effectually imparting to others the knowledge which he has received. A storehouse full of knowledge is useless unless the teacher can impart to others a clear understanding of what must be known and done, and how to actually perform the necessary operations of a job. Pedagogy is a profession in itself and must be mastered before a tradesman can bcome a teacher.

Before a teacher can be recommended to a position by an institution, he must have thoroughly demonstrated his ability, both as a tradesman and an instructor, with a regular class of pupils and under the supervision of a competent critic. If he passes this procedure there is no reason why he should not be ready to make successful progress as an instructor of printing.

The Shop-Trained Man

On the surface it would seem that the shop-trained man would make the ideal person to teach printing in the school because of his extended training in practical work. In many instances this has proven to be the truth, and in numerous cases it has not.

Without a doubt the shop-trained man, if his training has been of a broad nature, has the necessary trade knowledge to become a teacher but unless he also knows how to *teach* what he knows he will be a novice in the classroom. There is a vast difference between knowing a subject and knowing how to teach it. Some people have a natural manner of passing on to others the things they have learned, while others learn quickly themselves but are utterly lost when it comes to instructing others. For this reason it is difficult to say that a shop man will or will not make a good teacher, and the natural ability of the individual largely determines his success.

There is one serious drawback to this type of an instructor; that of going directly from the shop where production is first, to the classroom where instruction must predominate. In the shop the chief aim is to produce as rapidly and economically as possible, with, of

course, due consideration to the quality of the work. The workman learns to work quickly and skillfully but he is seldom called upon to analyze the procedure of his operations. It is not necessary, nor ordinarily profitable, for him to take the time to explain to others *why* he does this or that, or why this particular method is preferable to others which may accomplish the same result. He knows how to do it, he gets good results, and that is what he is paid for. If called upon to organize his knowledge of a complete trade so that the operations are in the sequential order for teaching he encounters the first real difference between production and instruction. In the school shop the chief aim is instruction and production is, or should be, merely the result of good instruction. In other words, the object is not to produce a large volume of printed products as rapidly as possible. It is rather to systematically teach the pupils the operations comprising the trade, together with such technical and related information to clearly give a complete understanding of the operation. In order to do this, it is necessary that the work be properly organized and taught with as much skill as the actual performing of the operations themselves. This skill is not trade skill, but rather it is the professional skill required of an instructor.

Assuming that the man is naturally a good instructor and can effectively organize his knowledge, the remaining factor to his success as a teacher is the nature of his trade training. In this day and age, with printing becoming more and more specialized, it is difficult to find men who have learned what may be termed the printing trade. With specialized occupations we have compositors, stonemen, pressmen, etc., each well informed and skilled in their work, but with little or no knowledge of the related occupations. The old-time country printers are getting scarce and this is practically the only opportunity for receiving such training as is required for the school shop. Of course this does not hold where the school shop is large enough to employ specialized instructors in printing but such cases are rare. In most schools, the entire department is in charge of one man. He must have a knowledge of the trade broad enough to give such instruction as will carry the job through the operations necessary for its completion.

Without a doubt an extended trade knowledge is a valuable asset to an instructor of printing. If it is of a broad nature, accompanied by professional knowledge, the shop man should make a successful instructor.

The Shop-Man With Teacher Training

In the shop-trained man with teacher training we have what is probably the ideal combination for a printing instructor. Here we have the actual shop practice put over by a man who can combine industrial operations with professional teaching methods. This type of an instructor is most desirable for the vocational and trade schools where the objective is to train apprentices and tradesmen, because of the shoplike atmosphere which will be created. Having worked in the industry himself he knows what will be expected of his students under actual trade conditions. For this reason he should keep in continual touch with developments in the local shops so that he may supply the community with trained workers.

This type of instructor may serve very satisfactorily in the public school classroom, provided he has not worked so long in the shop that he has formed mechanical habits no longer changeable. From the shop to the classroom is a big step, and there is a radical change of atmosphere, and the teacher must adapt himself to new surroundings and associates. He turns from a working level with mature minds to the development of juvenile minds with the result that his responsibilities are greatly increased.

From experience it has been proven that some of the best instructors for public-school classes are men who have had from three to five years of trade experience. This experience should be either continuous, or while attending high school followed with from two to four years of teacher-training. While age is not an important factor for successful teaching, it is advisable that the candidate receive his professional training early so that his mind and habits are sufficiently flexible for adaption to the basic principles of instruction. With a good foundation of trade practices, and with considerable skill as a worker, he is well fitted to mould his knowledge into form for teaching. In the teacher-training institution he learns to analyze his work and to organize in such a way that it can be most effectively passed on to the students. He receives the teacher's point of view and learns the best methods of presentation and the various means of checking, or recording, the progress of his pupils.

The cooperative system is another means of combining teacher-training with actual shop practice, and, while still rather new, it is rapidly proving to be an ideal method of training shop teachers. Under this system the man divides his time between professional training in the school and the industry itself. He spends a period in the shop getting his trade work, and then goes to the school for the organization and professional application of the knowledge obtained.

This system of training is possible only where the institution is located in or near a city large enough to accommodate a large number of students in the printing industry. Usually an agreement is made between the school and the employer which permits the students to work in pairs. One man works in the shop while the other attends school, and then they reverse. By this method one man is always at work in the shop and the working force does not fluctuate. Likewise the classes at school are smaller, permitting individual attention for the student. Many of the larger universities and institutions have adopted this system with steadily growing success.

It is almost ideal because the man receives his shop work with a definite aim, and under regular trade conditions where real jobs are turned out by the latest and best devices and machinery. He learns as rapidly as possible, because he is paid in proportion to his productive value to the concern for which he is working, and at the same time digs for the "why" as well as the "how" with the idea of passing it on to his future students. In the school he has the opportunity to analyze what he has obtained in the shop and to mould it into the best form for teaching.

Even with this ideal combination of trade and professional training too much cannot be expected of the teacher at the beginning. Experience is not only the best teacher, but it also makes the best teacher. Few beginners are at ease when addressing a class and it requires much time and practice to organize and present thoughts so that the pupils will best grasp them. The first year or two will be required for experimental instruction and many teachers do not come to their best until having taught for an even longer period than this.

In conclusion, it might be said that, all things being equal, this latter type of training should produce the best instructors. However, many first-class instructors have come from the other types, and the individual make-up of the man has considerable bearing on his success as a teacher.

An Experiment in Method for Woodwork

A. Adele Rudolph, Supervisor Industrial Arts, Philadelphia, Pa.

The question, "which is the best method for teaching box construction," recently led to an interesting experiment. Various methods of teaching box construction were considered and seven possible methods were noted. (Fig. 1 which illustrates that Method I

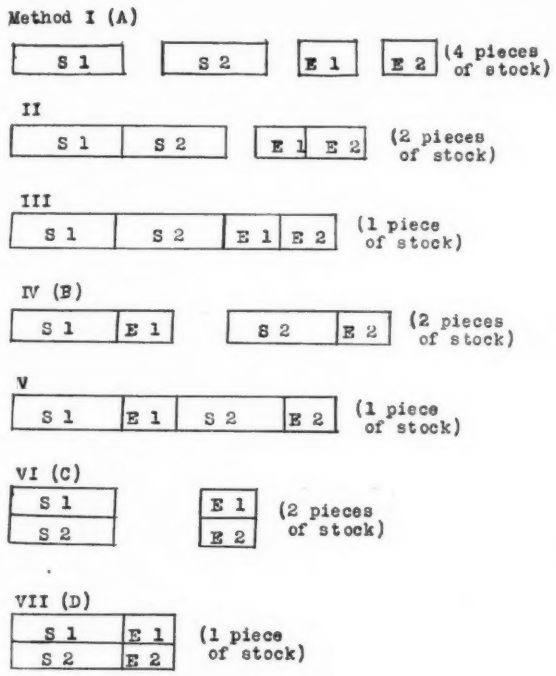


FIG. 1.

requires the manipulation of four pieces of stock, Methods II, IV, VI of two pieces, and Methods III, V, VII of one piece.) It was decided that the size of the box, the width of the available lumber supply and skill in tool manipulation might influence the method selected. The problem was then stated thus: Which method of getting out the stock for the sides and ends of a box should a class be led to choose that will result in the least amount of time consumed in getting out the stock from a board and in the greatest educational return to the student, and at the same time practically insure the greater number of first chances in producing (1) ends or sides that are duplicates and (2) duplicate ends and sides of same height? Then it was decided that the best way to prove which method should be given preference in teaching was to experiment,[1] and for the purpose of the experiment to discard Methods II, III, V and to use Methods I, IV, VI, VII, hereinafter designated as Methods A, B, C, D, respectively, as being the ones likely to be found in use in most school shops—elementary or higher.

The four lower sixth grades in six shop centers were chosen to participate in the experiment, since the study of boxes and containers was planned for this grade and since during the winter of the previous year the pupils had had about 25 hours of woodwork. The racial factor as an element in influencing the results was controlled by selecting one school from each of the following districts: American (comparatively well-to-do), colored, cosmopolitan, Italian, Jewish, and suburban. The selected four classes in each shop had been taught by the same teacher during the past two years, so that comparison among the classes of the same school should give a true result. In order to identify its own work, each school selected a symbol known only to the teacher and pupils concerned.

Certain factors having been controlled, the next step was the selection of the size of the box and the preparation of directions for the experiment. Before proceeding, it was necessary to discover the median ability of each of the four classes in each school in order that the methods might be apportioned according to the median ability of each. Squaring up a piece of

[1]Those taking part in the experiment and scoring, other than the writer, were the following teachers of Industrial Arts in the Philadelphia Public Schools—Mrs. Harris, Mrs. Ulrich, and the Misses Baechle, Crissy, deFord, Hamilton, MacFarland and Speel. Valuable assistance was given by Dr. A. Duncan Yocum, Professor of Educational Research and Practice and Dr. LeRoy A. King, Assistant Professor of Educational Measurements and Administration, University of Pennsylvania, and Mr. Ben F. Slingluff, Supervisor of Mechanic Arts, Philadelphia Public Schools.

S2S stock to definite dimensions was the preliminary test chosen to determine this median ability.

The stock for this preliminary test was S2S to 3/8" basswood to be trued to 3"x8". Two large blue prints of the drawing were used in each shop. Each boy was given a mimeographed copy of the test. (Fig. 2.) The method of procedure in giving standardized tests laid down in *Courtis Standard Research Tests* was followed throughout the entire experiment. And it was rigidly enforced that no student should receive assistance or criticism of any sort throughout the entire experiment.

Immediately after this test, the boys' work was sent to the central office and the committee met to discuss what method should be used in scoring the pieces of wood. The idea of selecting five pieces of work and forming a five-point scale was discussed but abandoned as not the most practical and useful method from the standpoint of continuity; the pictorial method was tried but the influence of the third dimension soon became a troublesome factor; finally a score card was evolved that could be used in any grade under any conditions when rating S2S stock, and one that in the hands of students has proven an incentive in raising their standard of workmanship. (See Fig. 3.)

In evolving this score card it is interesting to note that twenty descriptive topics had been selected for scoring before the pieces of wood were rated. By the time one hundred pieces had been examined the twenty topics had increased to 47 different topics with as many subdivisions. Thinking that every possible combination had now appeared, the scoring was continued on the second hundred, but different combinations of inaccuracies were continually being discovered. All the combinations of error were now analyzed and it was found that there were only five main topics—working edge, second edge, first end, second end, corners—each with several subdivisions or variations from perfection. These five main topics were now weighted so that the total would equal 100 in order that a perfect piece of work could be rated 100 per cent. It was soon found that this method of weighing would not do if the relative usefulness of each finished piece of work was considered. By this time about four hundred pieces of wood had been critically examined, the frequency of various errors was known, and, what is more important, the effect of the various errors on the value of the finished piece of wood was also known. From this knowledge, and after trying out new weights in scoring several hundred pieces of wood, the score card (Fig. 3) was developed and was used throughout the experiment. All pieces of wood from the preliminary test were rescored, using the new score card. The results of the preliminary test and the methods in getting out stock for the sides of a box to be followed by each class in the test in method are to be found in Table 1. (Fig. 4.)

It might be helpful at this point to consider some of the facts that influenced the committee in deciding the relative worth and difficulty of the four methods of box construction which were rated by the score card evolved in the preliminary test discussed above.

BOX CONSTRUCTION—METHOD A

For

1. If one piece is spoiled because of being too small or irregular—less waste in material to throw away and less waste in time to duplicate.
2. Drill desirable for skill.

Against

1. Last piece of the four because of drill should be more nearly correct, therefore possibility of obtaining no two pieces alike in resultant measurements.
2. Do same processes over and over again—nothing new learned in planing stock—skill end point.
3. End planing difficult on narrow widths, and there are eight ends to be planed under this method.
4. Demands great muscular control.
5. No thinking or planning in terms of whole, of influencing elements.
6. There are 37 chances of error in this method (16 planings, 4 gaugings, 8 scribings, 4 sawings and 5 measurements).

—METHOD B

For

1. Obtain adjacent sides of equal width without extra planing and gauging.
2. Provides for planning of stock.

Against

1. Does not provide for obtaining opposite sides of equal lengths except through the use of a "master piece" which takes skill in handling.
2. End planing difficult on narrow widths; and there are eight ends to be planed.
3. Although better than Method A—eliminates six possibilities of error that might occur in Method A—yet there are 31 chances of error in this method (12 planings, 2 gaugings, 8 scribings, 4 sawings and 5 measurements).

—METHOD C

For

1. Obtain opposite sides of equal lengths without extra planing, scribing and measuring.
2. Provides for planning of stock.
3. End planing much easier because of width of lumber; and there are only four ends to be planed under this method.
4. Better than Method B—eliminates four scribings, a process which is more difficult than gauging—and four end planings; although the number of chances (31) of error in this method (12 planings, 6 gaugings, 4 scribings, 4 sawings, 5 measurements) remain the same in number as in Method B.

Against

1. Possibility of error in obtaining adjacent sides of equal width.
2. Difficulty of holding wide pieces of stock in the vise.

—METHOD D

For

1. Obtain opposite sides of equal length and four sides of equal width without extra measuring, planing, gauging and scribing.
2. Eliminates difficult end planing—only four ends to be planed and these are all over 2" wide.
3. Muscular control—easiest.
4. Provides for planning of stock—combination of Methods B and C.
5. There are 25 chances of error—practically 50 per cent less than in Method A and 25 per cent less than in either Method B or C—(10 planings, 3 gaugings, 4 scribings, 4 sawings, 4 measurements).

Against

1. Possibility of error in obtaining parallel edges.
2. Difficulty of holding wide pieces of stock in the vise.

Note: In listing the chances of error, the number of testings were not included because the use of the try-square in this instance was considered a check on the work.

On a priori grounds Method A, which seemed to be the most difficult, was given to the best class, Method

SCORE CARD FOR MEASURING ABILITY IN SQUARING UP S2S STOCK

Locations	Descriptions	Perfect	Deductions for Errors — Deviations of:- 1/32"	1/16"	1/8"	1/4"	1/2"
Working Edge	Straightness - level, slight leeway*	-	1	-	-	-	-
	- convex	-	-	3	8	15	-
	- concave	-	-	5	10	20	-
	Not square** with working side	-	1	3	10	25	-
Second Edge	Not parallel with working edge	-		2	5	10	15
	Width*** - oversize	-	1	2	5	8	10
	undersize	-	-	3	8	15	25
	Not square** with working side	-	1	2	7	20	35
First End	Not square** with working edge	-	1	2	7	20	
	" square** " " side	-	1	2	7	15	-
Second End	Length*** - oversize	-	-	2	5	8	10
	- undersize	-	-	3	8	15	25
	Not square** with working edge	-	1	2	7	20	30
	" square** " " side	-	1	2	7	15	-
Corners or Edges	Splits or Chips**** thickness	-	-	2	3	5	10
Sides	Splits or Chips**** " (over)	-	-	3	5	-	

Philadelphia Public Schools - Score Card - Woodwork - 1922

FIG. 3. FRONT OF CARD.

SCORE CARD

Deductions for errors	Score	Deductions for errors	Score
0	100% - 20 points	51 - 55 -	45% - 9 points
1 - 5 -	95% - 19 "	56 - 60 -	40% - 8 "
6 - 10 -	90% - 18 "	61 - 65 -	35% - 7 "
11 - 15 -	85% - 17 "	66 - 71 -	30% - 6 "
16 - 20 -	80% - 16 "	71 - 75 -	25% - 5 "
21 - 25 -	75% - 15 "	76 - 80 -	20% - 4 "
26 - 30 -	70% - 14 "	81 - 85 -	15% - 3 "
31 - 35 -	65% - 13 "	86 - 90 -	10% - 2 "
36 - 40 -	60% - 12 "	91 - 95 -	5% - 1 "
41 - 45 -	55% - 11 "	96 -100 -	0 - 0 "
46 - 50 -	50% - 10 "		

* Straight or square with leeway of less than 1/32"
** If in doubt as to whether it is a leeway or less than 1/32 or not square, examine end of surface being scored.
*** If not parallel with surface from which measurements are being taken, measure narrowest width or length.
**** Score only for splits or chips caused by end planing. Score for thickness at end not for length.

Note:- All scoring to be done before sandpapering the wood.

FIG. 3A. BACK OF CARD.

B to the second best, Method C to the third best and Method D, which seemed to be the least difficult, to the poorest.

During the second test, the Courtis procedure in conducting tests was followed, and a mimeographed copy of directions was given to each pupil. (Fig. 5, A-B-C-D.) Two schools had to drop out of the experiment because conditions arose during the giving of the test which made the results valueless from the standpoint of comparison. The box-pieces from the other four schools (I, II, IV, VI) were scored, and the results are shown in Tables 2 and 3. (Fig. 6 and 7.)

METHOD OF PROCEDURE IN SQUARING UP STOCK

Instructions

You will be given one hour in which to square up this piece of stock to the dimensions given on the blue print. Follow the directions on this paper. You are not expected to be able to finish all the directions. You will be scored for time and for how true you square-up the piece of wood, but it is more important to have each part of the wood true than to finish the entire piece in the hour.

Directions

I. **Surface—select straighter side.**
Mark it WORKING FACE.

II. **First Edge—select straighter edge.**
1. Draw line close to edge.
2. Plane to line.
3. Test.
4. Mark it WORKING EDGE.

III. **Second Edge—to be made parallel with working edge.**
1. Lay off required width on both sides.
2. Plane to line.
3. Test.

IV. **First End—to be made square with working edge.**
1. Select better end.
2. Scribe line around wood close to end.
3. Plane to line.
4. Test.

V. **Second End—to be located square with working edge.**
1. Lay off required length.
2. Scribe line around wood (take off surplus).
3. Plane to line.
4. Test.

FIG. 2—DIRECTIONS FOR PRELIMINARY TEST

TABLE I—Tabulation of results in Preliminary Test—Squaring-up Piece of S2S stock

School	Class	Accuracy (Median)	Rate (Median)	In Test No. 2 to follow Method
I	1	70%	38 min.	A
	2	30%	26 min.	D
	3	50%	26 min.	C
	4	70%	42 min.	B
II	1	55%	42 min.	C
	2	60%	40 min.	B
	3	65%	46 min.	A
	4	50%	48 min.	D
III	1	50%	40 min.	B
	2	45%	28 min.	C
	3	55%	32 min.	A
	4	45%	30 min.	D
IV	1	50%	32 min.	D
	2	60%	34 min.	A
	3	55%	30 min.	C
	4	55%	18 min.	B
V	1	25%	34 min.	D
	2	45%	54 min.	B
	3	55%	30 min.	A
	4	35%	54 min.	C
VI	1	77%	36 min.	A
	2	77%	36 min.	B
	3	60%	48 min.	C
	4	50%	40 min.	D

FIG. 4

A METHOD OF PROCEDURE IN SQUARING UP STOCK FOR THE SIDES OF A BOX

Instructions

You will be given four lessons in which to square up the sides and ends of the box to the dimensions given on the blackboard. Follow the directions on this paper. You are not expected to be able to finish all the directions. You will be scored for time and for how true you square-up the pieces of wood, but it is more important to have each piece of wood jointed to dimensions than to finish the work in a short time.

Directions

I. **Surface—straighted side** (select on each piece of wood).
Mark it WORKING FACE.

II. **First Edge—straighter edge** (select on each piece of wood).
1. Draw line close to edge.
2. Plane to line.
3. Test.
4. Mark it WORKING EDGE.

III. **Second Edge—to be made parallel with working edge.**
1. Lay off required width on both sides on each piece of wood.
2. Plane to line.
3. Test.

IV. **First End—to be made square with working edge.**
1. Select better end on each piece.
2. Scribe line around each piece of wood close to end.
3. Plane to line.
4. Test.

V. **Second End—to be located square with working edge.**
A. **Long pieces of wood.**
1. "Master piece" (select and mark it).
2. Lay off required length on "master piece."
3. Scribe line around wood.
4. Use "master piece" as a standard and lay off the required length against the second piece of wood.
5. Scribe line around second piece of wood.
6. Take surplus off each piece.
7. Plane to lines.
8. Test each piece.

B. **Short pieces of wood.**
1. "Master piece" (select and mark it).
2. Lay off required length on "master piece."
3. Scribe line around wood.
4. Use "master piece" as a standard and lay off the required length against the second piece of wood.
5. Scribe line around second piece of wood.
6. Take surplus off each piece.
7. Plane to lines.
8. Test each piece.

FIG. 5—DIRECTIONS FOR SECOND TEST—METHOD A.

Upon analysis it is seen that the difference between the median accuracy maintained in the better classes following Methods A and B and the poorer classes following Methods C and D is 17.2 per cent in favor of the latter. Therefore, it may be said that Methods C and D should produce the better results from the standpoint of accuracy in all classes. Method C gained 18.3 per cent in accuracy over Method D. This may be due to the fact that students following Method C had more ability than those following Method D, or it may be due to the fact that Method C, requiring a shorter

A METHOD OF PROCEDURE IN SQUARING UP STOCK FOR THE SIDES OF A BOX

Instructions

You will be given four lessons in which to square up the sides and ends of the box to the dimensions given on the blackboard. Follow the directions on this paper. You are not expected to be able to finish all the directions. You will be scored for time and for how true you square-up the pieces of wood, but it is more important to have each piece of wood jointed to dimensions than to finish the work in a short time.

Directions

I. **Surface—straighter side** (select on each piece of wood). Mark it WORKING FACE.

II. **First Edge—straighter edge** (select on each piece of wood).
1. Draw line close to edge.
2. Plane to line.
3. Test.
4. Mark it WORKING EDGE.

III. **Second Edge—to be made parallel with working edge.**
1. Lay off required width on both sides on each piece of wood.
2. Plane to line.
3. Test.

IV. **First End—to be made square with working edge.**
1. Select better end on each piece.
2. Scribe line around each piece of wood close to end.
3. Plane to line.
4. Test.

V. **Second End—to be made square with working edge.**
1. Scribe line around each piece of wood close to end.
2. Plane to line.
3. Test.

VI. **Inside Ends—to be located square with working edge.**
1. "Master piece" (select and mark it).
2. From the 1st end, lay off the required length of the longer side on the "master piece."
3. From the 2nd end, lay off the required length of the shorter side on the "master piece."
4. Scribe lines around.
5. Use "master piece" as a standard and lay off the required lengths from their respective ends.
   (1) Of the longer side of the box against the second piece of wood.
   (2) Of the shorter side of the box against the second piece of wood.
6. Scribe lines around second piece of wood.
7. Separate the pieces of wood.
8. Plane to lines.
9. Test.

FIG. 5—DIRECTIONS FOR SECOND TEST—METHOD B.

A METHOD OF PROCEDURE IN SQUARING UP STOCK FOR THE SIDES OF A BOX

Instructions

You will be given four lessons in which to square up the sides and ends of the box to the dimensions given on the blackboard. Follow the directions on this paper. You are not expected to be able to finish all the directions. You will be scored for time and for how true you square-up the pieces of wood, but it is more important to have each piece of wood jointed to dimensions than to finish the work in a short time.

Directions

I. **Surface—straighter side** (select). Mark it WORKING FACE.

II. **First Edge—straighter edge** (select).
1. Draw line close to edge.
2. Plane to line.
3. Test.
4. Mark it WORKING EDGE.

III. **Second Edge—to be made parallel with working edge.**
1. Lay off twice required width plus surplus on both sides.
2. Plane to line.
3. Test.

IV. **First End—to be made square with working edge.**
1. Select better end.
2. Scribe line around wood close to end.
3. Plane to line.
4. Test.

V. **Second End—to be made square with working edge.**
1. Scribe line around wood close to end.
2. Plane to line.
3. Test.

*VI. **Inside Ends—to be located square with working edge.**
1. From the 1st end, lay off the required length of the longer piece.
2. From the second end, lay off the required length of the shorter piece.
3. Scribe lines around.
4. Separate the pieces of wood.
5. Plane to lines.
6. Test.

*VII. **Inside Edges—to be located parallel with outside edges.**
1. Lay off required width.
2. Separate the pieces of wood.
3. Plane to lines.
4. Test.

*Follow directions in left column (VI—1, 2, 3 & VII—1) and then follow those in right column (VI—4, 5, 6 & VII—2, 3, 4).

FIG. 5—DIRECTIONS FOR SECOND TEST—METHOD D.

TABLE 2—TABULATION OF MEDIAN ACCURACY SCORES FOR EACH CLASS WITH THE GAIN OR LOSS IN ACCURACY

		TEST NO. I*	TEST No. 2						
School	Class	Accuracy Median	Method A Acc. Med.	Method B Acc. Med.	Method C Acc. Med.	Method D Acc. Med.	Gain	Accuracy Median Loss	Total
I	1	75%	65%				..	13.3%	
II	3	70%	70%				0	0	
IV	2	75%	70%				..	6.6%	
VI	1	70%	70%				0	0	
									5% average loss
I	4	80%		70%			..	12.5%	
II	2	65%		65%			0	0	
IV	4	70%		70%			0	0	
VI	2	70%		70%			0	0	
									3.1% average loss
I	3	Records lost between shop and central office					..	..	
II	1	70%			70%		0	0	
IV	3	55%			70%		27.3%	..	
VI	3	65%			75%		15.4%	..	
									14.2% average gain
I	2	65%				75%	15.4%	..	
II	4	70%				70%	0	0	
IV	1	65%				70%	7.7%	..	
VI	4	60%				75%	25 %	..	
									12% average gain

*Only the score of those pupils who were present during the first test and who were not absent at any time during the four periods of the second test are included.

FIG. 6.

TABLE 3—TABULATION OF THE NUMBER OF FIRST CHANCES—PAIRS AND OPPOSITE DUPLICATES

School	Class	Method	Pairs*	Opposite Duplicates**	Total Number of Pairs***
I	1	A	15.2%	5.2%	9.2%
II	3		20.0%	15.0%	25.0%
IV	2		35.7%	21.4%	39.2%
VI	1		55.3%	6.6%	33.3%
			Average..31.6%	12.1%	26.7%
I	4	B	36.3%	0	18.1%
II	2		30.0%	4.3%	19.5%
IV	4		33.3%	0	16.6%
VI	2		50.0%	7.1%	32.1%
			Average..37.4%	2.9%	21.6%
II	1	C	42.1%	36.8%	60.5%
IV	3		59.1%	7.1%	35.7%
VI	3		10.0%	40.0%	45.0%
			Average..37.7%	28.0%	47.7%
I	2	D	18.1%	18.1%	27.2%
II	4		25.0%	33.3%	45.8%
IV	1		60.0%	20.0%	40.0%
VI	4		40.0%	40.0%	60.0%
			Average..35.8%	27.9%	43.3%

*"Pairs" consist of two ends or two sides that are squared up duplicates, i. e., equal in length and width.
**"Opposite Duplicates" are paired ends and sides of same height, i. e., ends of same length, sides of same length and all four of same width—all four pieces squared up ready to assemble to make the box.
***"Total Number of Pairs" includes all ends and sides that are duplicates whether "Opposite Duplicates" or only "Pairs."

FIG. 7.

A METHOD OF PROCEDURE IN SQUARING UP STOCK FOR THE SIDES OF A BOX

Instructions

You will be given four lessons in which to square up the sides and ends of the box to the dimensions given on the blackboard. Follow the directions on this paper. You are not expected to be able to finish all the directions. You will be scored for time and for how true you square-up the pieces of wood, but it is more important to have each piece of wood jointed to dimensions than to finish the work in a short time.

Directions

I. **Surface—straighter side** (select on each piece of wood). Mark it WORKING FACE.

II. **First Edge—straighter edge** (selecct on each piece of wood).
1. Draw line close to edge on each piece.
2. Plane to line.
3. Test.
4. Mark it WORKING EDGE

III. **Second Edge—to be made parallel with working edge.**
1. Lay off twice required width plus surplus on both sides on each piece of wood.
2. Plane to line.
3. Test.

IV. **First End—to be made square with working edge.**
1. Select better end on each piece.
2. Scribe line around each piece of wood close to end.
3. Plane to line.
4. Test.

V. **Second End—to be located square with working edge.**
1. Lay off required lengths on each piece of wood.
2. Scribe line around each piece of wood (take off surplus).
3. Plane to line.
4. Test.

VI. **Inside Edges—to be located parallel with outside edges.**
1. Lay off required width on both sides on each piece of wood.
2. Separate the pieces of wood.
3. Plane to lines.
4. Test.

FIG. 5—DIRECTIONS FOR SECOND TEST—METHOD C.

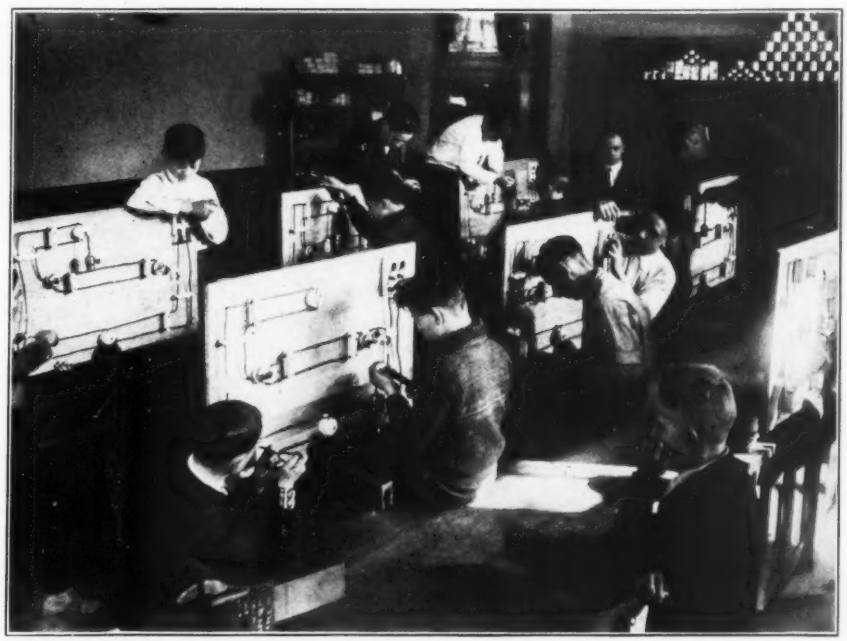
piece of wood than in Method D, was less difficult to square-up parallel—the longer the piece of wood the more difficult the feat for unskilled youngsters to square-up the edges parallel. This also seems to be one of the reasons why Method B made a much poorer showing than Method A.

It is interesting to note in comparing the results under "Opposite Duplicates" that more than 25 per cent of the pupils in the poorest classes, following Methods C and D, prepared their stock—100 per cent ready first time for assembling in box construction—without individual help or criticism from their teacher. Method C is apparently a slightly surer method than D.

Method B seems to be the most difficult from the standpoint of obtaining squared-up opposite duplicates for a box, whereas Method A is 56.7 per cent less efficient in obtaining first hand results than Method C.

From this experiment it would appear that Method C is the best all-round teaching method of the four that were tested; but before it could definitely be proven to be the best for the individual, it would need to be tried out on a much larger scale than with one-fourth of six hundred pupils of only one grade, and individual scores would need to be compared. The nature of the experiment precludes comparison of the four methods by the same pupil, since by that time the element of drill would influence results. Only by comparing the final scores of many individuals, who had obtained the same rating in the preliminary test, and, because they were in different classes, had to follow the different methods in the second test, could the results be more definitely stated.

Those interested in the experiment, however, felt that it did definitely prove that method in teaching woodwork should not be a haphazard selection on the part of the teacher.



PREVOCATIONAL CLASS IN ELECTRICAL WIRING, NEWARK, N. J.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

PRECEPTS AND PICTURES

The teacher of drawing is fond of advocating drawing as a universal language understood by all races of people; a means of self expression which needs no explanation. We recall the interesting experience of a drawing teacher who, while traveling in foreign lands, resorted to making a picture of his order for lunch with fair success.

We fear his pupils would not fare so well if dependent on the graphical expression of their wants. Few teachers have taught drawing to this very practical purpose. Few artists have a large vocabulary.

Though drawing would be a difficult and cumbersome means of expression for many of our needs it does clarify the meaning of written and spoken statement to a degree not sufficiently used by teachers.

Visible things have a way of fixing the attention and defining impressions which words do not have. The exact meaning of words is not well taught in our schools. Words of common use in the industrial arts need illustration. A class in design when asked to describe effects in design are often unable to tell what they see for want of words. They are confronted with words that have various meanings when they seek to define the effects of design. Words such as size, scale, tone, value, balance, finish, have different meanings according to their application. The word size has one meaning for the finisher and another meaning for the designer. The word scale has a distinct meaning to the fisherman as he catches his fish and another distinct meaning when he weighs it. This word scale means a different order of sequence to the draftsman, the designer and the musician. Tone, value, balance, finish, have each different reference to different interests.

No wonder the written and spoken word needs constant repetition to put over a single impression. No wonder we get so little from what we hear and read when words mean one thing to one person, another thing to another person and nothing to many. It is certain that oral and written instruction is, in part, confusing and useless.

In this day of convenient illustration, no school equipment is adequate without many pictures and much illustrative material.

There is but one fine art that is independent of visual illustration. Good music may sound best in the dark; yet our appreciation of music is often influenced for better or worse by the dramatic presentation of it.

Teachers may get suggestions for presenting ideas from the moving pictures. A few well chosen captions direct the interest and the illustrations do the rest. There, before our eyes, are evidences that every one understands. The plot unfolds. At last a conclusion is reached and, best of all, we take a little credit to ourselves for having reached the conclusion.

To hear about something may be interesting and suggestive but it is not always informing. To see is to believe against reason.

Of course, seeing and believing does not assure understanding.

Illustration is not a complete educational process.

Explanation and personal experience completes the process, but teachers are proverbially fond of lecturing. Our instruction needs less precepts and more pictures.

WHAT NEXT?

We hear on good authority that the County Industrial Arts teacher who travels from one community to another in a flivver and dispenses his wares like the itinerant peddler, is becoming common in some of the western states. In imagination, from wheels to wings to wireless, we conceive educational problems of the future solved as by magic. We conceive those bothersome, personal questions omitted from the teacher's recommendation. Indeed, the teacher is almost beyond our conception; but some one will have to keep order. Let the policeman do it.

FALSE PRETENCE

A circular letter from a "wood products company" advertises a collection of ready-made, wooden candlesticks, vases, lamps, etc.

According to this circular, the desire for such articles has so often been expressed by teachers that a department has been established to supply them in variety and quantity.

The letter concludes with this assurance: "With this assortment you can, at low cost, furnish some very interesting material for practical work, while the range of design is wide enough to meet most any need."

We are reminded of a business organization established a few years ago to supply orations, essays and theses on any desired subject, to those in need of them for graduation or public performance.

We are also reminded of a most convenient pill recommended by a humorist and guaranteed to give all of the sensations of a six-course dinner.

There can be no more serious indictment of industrial art instruction than that ready-made articles are given a little finishing in the shop and presented as the work of pupils.

Such methods have very little educational value and are pernicious in that they encourage false pretence.

RELATED SUBJECTS

One of the greatest advances that have been made in the field of practical education has been the organization and use of related subjects and subject matter. In the early years of educational shop work, the attention was devoted almost exclusively to manipulative processes and the acquiring of skill. The fact came gradually to be recognized that there exists in every trade a large body of information which the worker must acquire. Each trade or kind of work has its thought content and any intelligent handling of a trade involves the mastery of such content. At first, such a mastery was either not acquired or was gained by accidental and casual means. Of late, however, attempts are being made to organize and definitely outline the necessary trade or industrial information for teaching purposes.

Many of the efforts to teach this related information or subject matter have been both wasteful and unpedagogical. Instances come to mind where teachers in beginning a simple project in woodworking, have made such assignments as "Read up on all the different kinds of woods and their characteristics." Another extreme case is where a teacher of mechanical drawing reported that he took up the first lesson in describing the manufacture of lead pencils and the proper methods of sharpening them! It is sometimes difficult to see that some of the items considered are related to the actual business in hand.

Assignments to be effective should be definitely related to the task in hand, must be limited in scope, and within the grasp of the student in connection with the problem with which he is concerned. In addition to the specific matter assigned for investigation in relation to particular undertakings, readings of a more general character and of fuller scope may very well be listed or required.

This discussion has had in view the cases in which the shop instructor must have the responsibility for the related work without time allowance for separate classes. But even when the related subject matter is organized and taught by some one other than the shop teacher, the general principles stated above still hold good.

Every effort should be made to see that the so-called "related mathematics," "related science," etc., are definitely *related* both in point of fact and in the students' minds to actual problems, conditions, and materials in the shops. Unless this is so, such subjects will inevitably become as dead, meaningless, and uninteresting as similar subjects have been for generations past in the general education courses.

THE CURRENT SHIFT OF COSTS FROM FACTORY TO SCHOOL

It is generally conceded that the expansion of the school studies, the lengthening of pupil school life, together with a decline in the purchasing power of the dollar, have swelled the school costs to their present figures.

There is one phase in the question of costs, however, that has never been analyzed in its full economic meaning. We all know that the training which the schools now afford along industrial and commercial lines constitutes a contribution to efficiency in a thousand pursuits. But, have we measured that contribution in time and money in order to say what the manufacturer and merchant is getting for the larger tax tribute he now renders?

Let us put it in another way. Let us assume that the schools still confined themselves to the bare rudiments of a common school education, or at least eliminated all vocational studies and such high school training as now makes for a better mechanic, a more efficient accountant and a more successful salesman.

The cost of apprenticeship in that case, and the slower process of training for an industrial or commercial pursuit, is assumed by those who direct the producing and distributing forces. True, the cost of the more crude method of training will fall upon the industries, and the last instance upon the consumer.

There was a time when the merchant was obliged to develop a raw recruit into an efficient accountant or salesman. That took time and cost him and the recruit some money. The ultimate consumer shared in the loss. The merchant provides that training now, but he has a better prepared recruit to train. Hence a saving in training cost.

The factory apprentice system of old tells the same story. Under it, it took a longer time to train for a full-fledged journeyman. Whatever we may say about the virtues of old-time methods, the new is more practical and costs less money, simply because it takes less time to produce a skilful and intelligent mechanic.

But, what does this transition from one method to the other mean, or rather what economies are effected in a transfer of vocational training from the factory and office to the schoolhouse? Is the factory foreman as efficient in mechanical training as is the vocational schoolmaster? Does the chief clerk in an office impart to his recruits vocational knowledge with the thoroughness that the commercial instructor at the high school accomplishes this?

The answer must be that the time consumed in training recruits for efficiency in factory and office is not only materially shortened, but that a higher degree of efficiency is attained in the cultural background given to the school product. While the economies achieved in the shift cannot be exemplified in dollars and cents, they are nevertheless substantial and material.

The reasoning that must follow here is that if the schools cost more money, something else costs less. If the schools make a large contribution to efficiency in commerce and industry the production costs are lessened and the consumer is benefited. In other words, if the consumer paid less in school taxes for a restricted system of education, he would be called upon to pay more for the commodities and conveniences of life.

The Construction of Mah Jong Sets

E. M. Winterbourne, State Teachers' College, Silver City, New Mex.

THE ancient Chinese game of Mah Jong has proven so popular and interesting that a number of our students conceived the idea of making their own sets. We were well pleased with the results, and feel that it is a well-worth-while project, both educationally and from the point of interest. It adds variety in processes and materials to the usual wood working course.

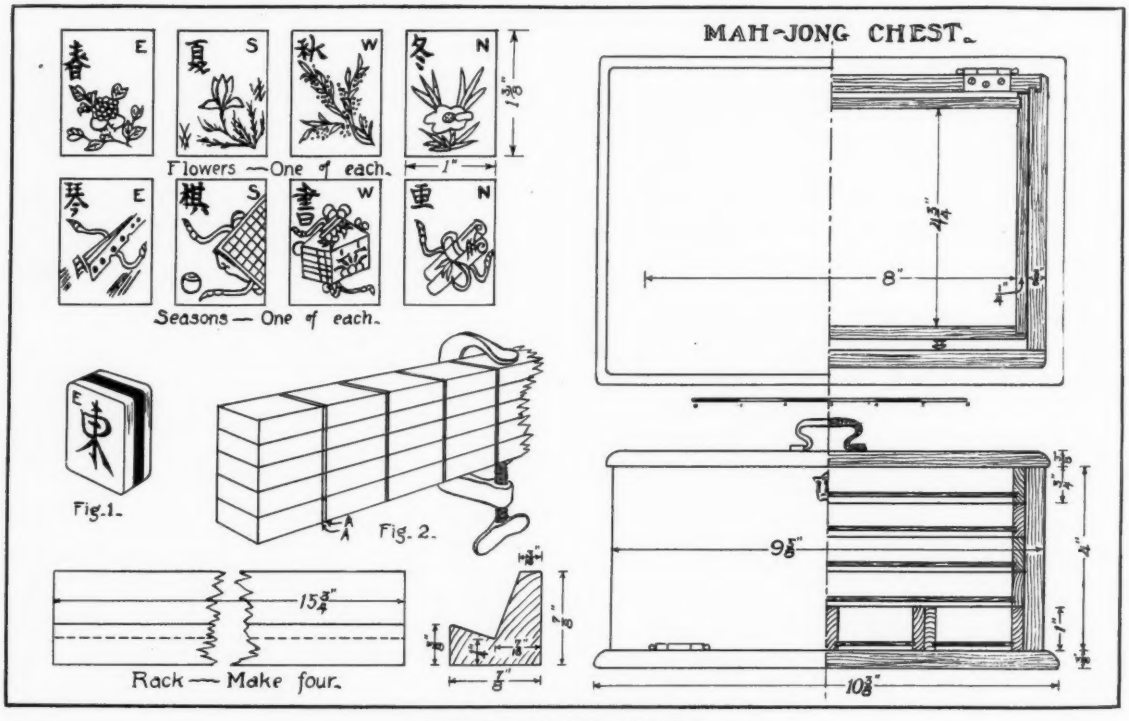
As complete books of instruction may be bought for a nominal sum, no effort will be made to give instructions for playing the game, and we shall confine ourselves to the actual construction of the sets.

It is necessary first to make 144 tiles of the same size. A suitable size for general use would be 3/8"x7/8"x1-3/16". These may be made in a variety of ways. The simplest style is made of solid blocks of some light colored wood, as sugar pine, basswood, holly, or maple. A better appearing set may be made by gluing up veneers to the proper thickness. Figure 1 shows the appearance of a tile, built up of two sheets of white imitation ivory,[1] with a heavy veneer of a dark-colored wood glued between. These make beautiful tiles that compare favorably with the finest sets excepting those made of real ivory. A firm-grained white wood might be substituted for the imitation ivory. If a veneer press is not available, the veneers for the tiles may be glued up in long strips, and clamped with ordinary hand screws.

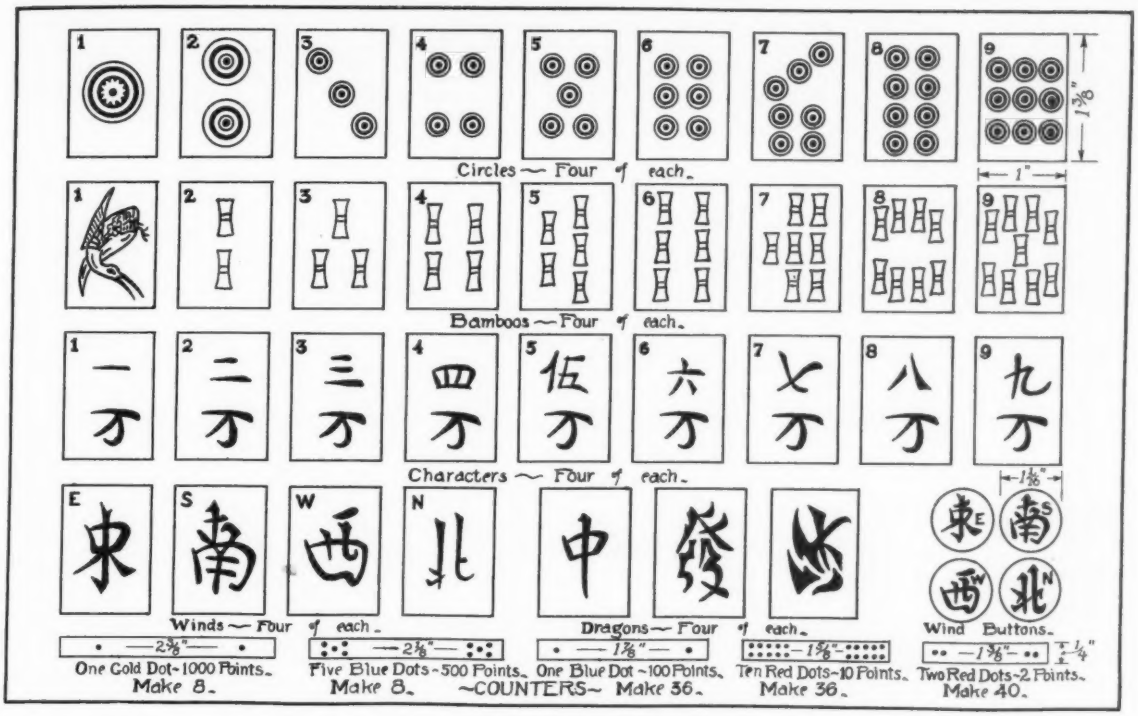
Long strips of the wood selected, or of the built-up veneer should be gaged and planed to the proper width, then gaged and planed to the proper thickness. These strips may then be piled evenly on top of one another, and the top strip marked off into lengths, using a square and sharp knife for the marking. A double line should be made, as at AA, Figure 2, allowing slightly more than the thickness of the saw between to allow for sandpapering the ends. While sawing the strips may be held together with clamps. The ends should be finished by sandpapering. If no sandpapering machine is available, a satisfactory substitute may be made by gluing sandpaper to a disk of wood, fastened to the faceplate of a lathe. The tiles may then be sandpapered by holding them against the revolving disk.

The figures are put on the tiles by stamping with linoleum stamps. Get a good grade of plain linoleum such as is used for the running boards of cars, and glue and clamp it to 3/4" pine. This may then be sawed up into blocks of the right size for the stamps. The designs should be drawn directly on the linoleum in a reversed position. They may then be cut out with a pocket knife. A veining tool will be found useful in cutting away the excess material, but is not essential. It is not necessary to cut a separate stamp for each of the different kinds of tiles. For instance, the numbers from one to nine may be cut separately and used for all the suites; one large circle, one medium size circle, and one small circle are all that are necessary in the circle suite. In the same way units for the other suites may be made and stamped separately. If several sets are to be made, it would save time in stamping, to make a separate stamp for each kind. Pads of felt cut from an old felt hat serve for inking the stamps. Printers' colored inks, or oil paint, thinned with a small amount of turpentine should be spread on the felt pads with a palette knife. It is best to have each suite in the same color or combination of colors, so that the player will not confuse the suites. Otherwise it makes no difference which colors are used. The Dragons should be red, green, and purple respectively, as shown in the cut reading from left to right. The letters and Chinese characters on the Flower tiles should be blue or green, and those on the season tiles should be red. The pictures on these tiles may be colored to suit the fancy.

[1]Imitation ivory in sheets may be obtained from W. B. Fox & Bros., Inc., 21 Warren St., New York. This is not inflammable, as is a celluloid.



DETAILS OF A MAH JONG SET.


Circles — Four of each.
Bamboos — Four of each.
Characters — Four of each.
Winds — Four of each.
Dragons — Four of each.
Wind Buttons.
One Gold Dot - 1000 Points. Make 8.
Five Blue Dots - 500 Points. Make 8.
One Blue Dot - 100 Points.
Ten Red Dots - 10 Points.
~COUNTERS~ Make 36.
Make 36.
Two Red Dots - 2 Points. Make 40.

DETAILS OF A MAH JONG SET.

In the better sets, the tiles should be carved with a knife, rather than stamped. Oil colors may then be rubbed into the carving, and the faces again sandpapered, to remove the traces of paint on the plain part of the tile.

The counters may be made of wood, or imitation ivory, of about 1/16" thickness, 3/16" width, and from one to two inches length, there being a difference of ¼" in length for each succeeding step in the value of the counter. The wind buttons for designating the position of the players should be about ⅛" thick and about ½" diameter. A coat of varnish, or lacquer, will keep the tiles, counters, and buttons from becoming soiled.

The racks and the chest may be made of hardwood to suit the maker, walnut, rosewood, or mahogany being suitable. The chest may be finished plain, or may be carved or inlaid, with Chinese Dragons or Mah Jong characters, or the design might be worked in Gesso. Both the lid and the front should be hinged. The little drawers which hold the tiles are placed one on top of the other, so no drawer runners are necessary.

The Garage as a Project for the School Shop

Wadsor M. Scoville, State Normal and Training School, Oswego, New York.

IN vocational work today many teachers are called upon to build practical projects of useful things for the school. It has been the policy of the Industrial Teacher Training Department, State Normal and Training School, Oswego, New York, to carry on along with the regular work of the department, projects rather large in scope and embodying many lines of work. These larger projects are built by what is known as "the force of the school"—the interest, judgment, and instructional skill of the faculty members who are connected with the shops or trades involved in the project; the interest, enthusiasm, and work of the student body, together with necessary hired help to carry on the project. We call attention to such projects as (a) the pergola which embodied work in concrete, forge work, carpentry and painting; (b) the playground apparatus which embodied work in concrete, pipe fitting, wood working, sheet metal, and painting; and (c) the ornamental gate posts involving work in concrete and masonry. All of these projects were described in recent issues of the INDUSTRIAL ARTS MAGAZINE.

The garage which we are illustrating in this article was designed by the author and the drawings were executed by members of his class in architectural drawing. The carpentry work was done entirely by the class in carpentry during the summer session of 1923, Oswego State Normal School, under the instruction of Mr. William H. Beaven.

For the information of teachers who plan garages, or similar buildings, the following general specifications are given:

The builder shall give his personal attention to the work, furnish all materials, transportation, scaffolding, and appliances required for the full performance of the work, herein specified, except as may be otherwise mentioned. He shall outline the work and be responsible for its correctness. He shall obtain all necessary permits, pay the lawful fees charged therefor, and he shall be responsible for any violation of local laws or ordinances.

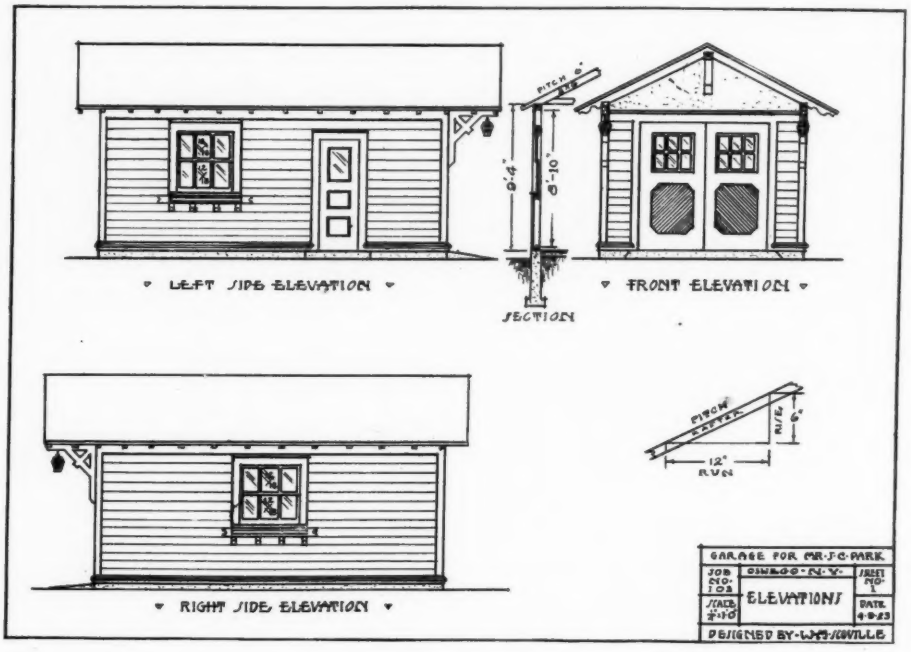
All materials employed in the construction are, unless otherwise specified, to be the best of their several kinds, subject to the approval of the architect and owner. All labor is to be performed in the best and most acceptable manner, and both workman and workmanship are subject to the owner's approval.

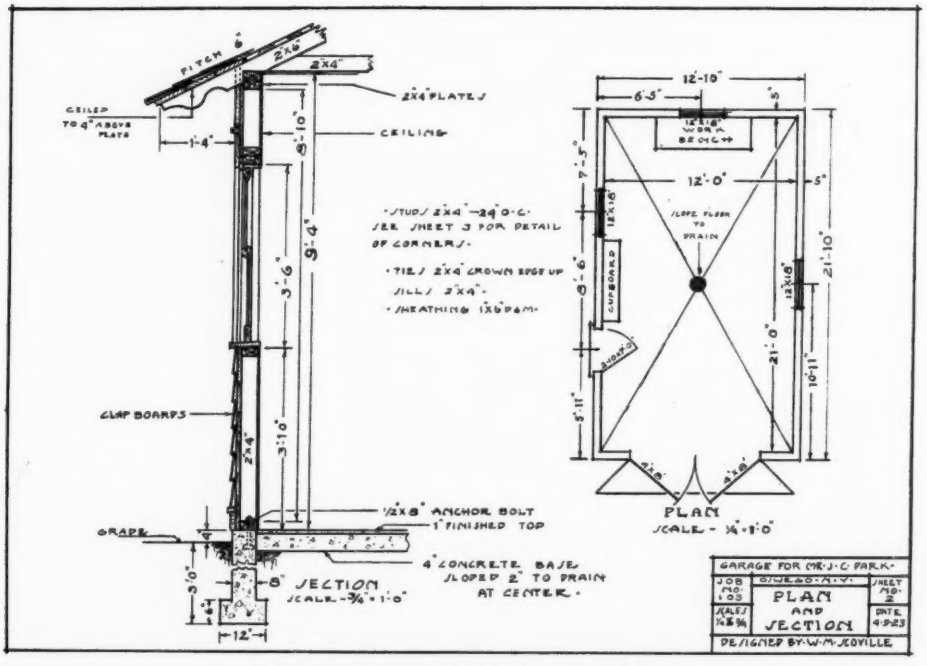
The drawings referred to are made to a scale of ¼"=1'. All drawings are intended to co-operate with these specifications and form a part thereof, and also form a part of the contract. Where figures are given, they are to be followed in preference to measurements by scale.

The drawings and specifications furnished for this work are instruments of service and the property of the owner, and are to be returned to him upon completion of the work herein set forth.

The builder shall take all possible care to protect all finished woodwork, which must be covered where necessary, and he shall upon completion of the work remove all unused materials, debris and rubbish, and repair any damage done to the work, no matter how or by whom caused (except damage by fire) leaving the premises broom clean and in perfect order at the termination of his work.

Architect. He shall be the interpreter of the intent and meaning of the drawings and specifications, and his decision shall be final and binding to both owner and contractor.





DETAILS OF A GARAGE BUILT BY STUDENTS.

Owner. The owner will furnish all hardware and do all electric work.

Drawings and Specifications. The drawings and specifications are to be considered as co-operative, and the work or material called for by one and not indicated in

the other is to be done as though fully treated by both.

If no figures or memorandum are given, drawings are to be accurately followed according to scale, but whenever there are figures, these are to be followed instead of scale. If there is a discrepancy it shall be referred to the architect.

Excavating. The builder will do all the excavating to the required depth. When the excavating is being done all the soil is to be put in stack, and used for grading as required. Builder will do what is known as rough grading.

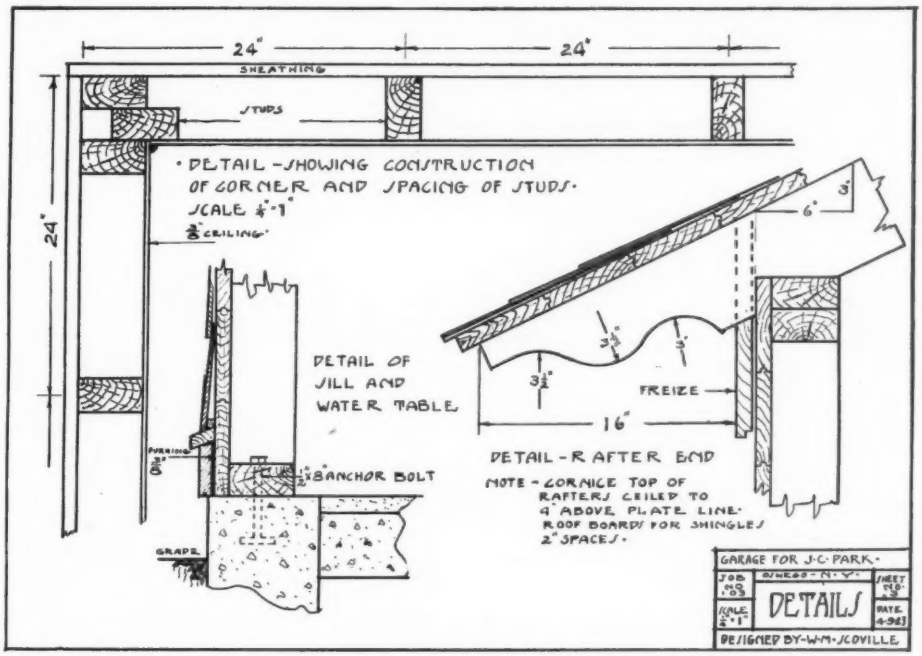
Preparation of Site. The builder will stake out building and erect permanent batter boards at such points that they will not be disturbed during the construction of the foundation.

Carpenter Work

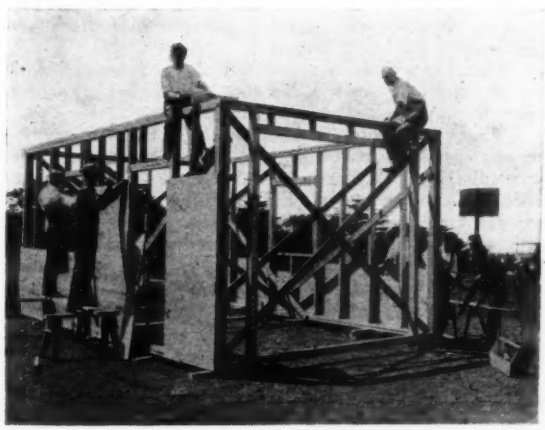
Carpenter Work. All necessary frame lumber to be good sound hemlock or spruce, and all timber used throughout must be prepared and framed according to the plans.

All trimmers and headers to be doubled around openings; all rafters to have crowning edges placed upwards; and all timbers to be properly sized where required.

THE CLASS AT WORK.



DETAILS OF A GARAGE BUILT BY STUDENTS.



THE JOB WELL UNDER WAY.

All studding, tie beams, trimmers and rafters to be well framed and nailed.

Sills	2"x4" doubled
Studding	2"x4" 24" on center
Ceiling joists	2"x4" 24" on center
Rafters	2"x6" 20" on center

Openings. All doors and openings to be double studded; use two 2"x6" doubled over all wide openings.

Furring. Put in furring wherever necessary to make a good job.

Exterior Finish. The exterior finish for window and door casings, and all manner of finish lumber shown on plans to be of good quality white pine, or cypress, free from all shakes, loose or black knots.

Sheathing. The building is to be sheathed on outside of frame with good sound ⅞"x6" N. C. pine matched and planed.

Cornice. Cornice will be of the open type and to be constructed as shown on plans and is to consist of facier, frieze, look outs, and bed mould. The top of look outs will be boarded with dressed and matched lumber as far as the plate line.

Roof Boards. Roof boards to be 1"x4" spruce or hemlock, laid about 2" apart, and well nailed to all rafters with 10d nails.

ALL READY FOR THE CAR.

Shingles. The roof is to be shingled with No. 1 red cedar (5 to 2) laid about 4¾" to the weather, well nailed with galvanized nails.

Window Frames. Window frames to be made in the ordinary manner; casings to be 1⅛"x4½"; jambs ⅞"x 4¾"; sash to be glazed with D. S. glass and to have necessary trimmings to keep both shut and open.

Door Frames. Large door frame to be 1½"x5" constructed 1¾" doors. Small frame to be 1⅛"x5" for 1⅜" door.

Door. The two large doors are to be made according to detail, 1¾" thick and ceiled diagonally on the back. To be hung with three butts and to have all necessary locks and fastenings.

The small door is to be of size marked on plan. Two panel O. G. with glass on top.

Doors to be made of white pine.

Trim. All inside trim including ceiling, casings, cupboards, etc., to be made of N. C. pine.

Concrete Work

Foundations. The foundation is to be an 8" concrete wall, using a mixture of 1—3—5.

Concrete Floor. Grade off and lay a 4" concrete base sloping 2" to drain in center. Base to be a mixture of 1—3—5. On top of this finish with a 1" top dressing of 1—2.

Painting

As soon as the exterior finish is in place it shall receive a priming coat of lead and oil. Before painting all knots shall be shellaced. When thoroughly dry, it shall be properly prepared to receive the last two coats of paint. Color to suit owner. All nail holes are to be putty stopped.

Stenciled Designs Applied in the Shop - II

William B. Wright, Public Schools, Albany, N. Y.

It is my hope that these articles may help to bring design in closer touch with the field of industrial intelligence. A pupil who has developed appreciation for good design through a series of exercises involving critical judgment between good and poor results and who has developed the power of expression by comparing, choosing, arranging and combining in the use of lines, light and dark and color, will be able as a producer, to apply the principles of good design, in placing upon the market a more beautiful, attractive and therefore more valuable article for consumption. As a consumer he will be the better able to make a more intelligent choice "in good taste". It is hardly necessary to point out its cultural and social advantages.

In my introductory article, I chose the book end as a simple shop problem, which offered an opportunity for a slight touch of the highly cultural element of esthetics. Different projects offer this opportunity in a varying degree. I know of no other small project suitable for the seventh or eighth grade offering a greater opportunity for this subtle influence to make itself felt, than the sconce.

This project can be handled in many different ways in metal and wood. It is important as a decorative feature in house furnishing, combining utility with an unlimited opportunity for originality and design. However, in the seventh and eighth grades, a simple method of arriving at a good effect is to be sought.

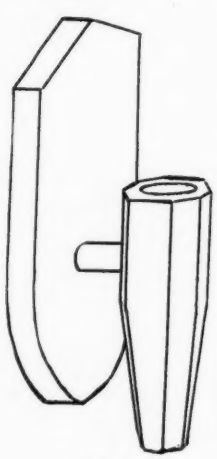


FIG. 1.

Nothing could be more simple, or more effective, than a pair of sconces made with three pieces of wood and decorated in the following manner.

In my presentation I shall follow the same method used in my first article, i. e., *thinking it out* and *working it out.*

First, the rough idea: Teacher — "The sconce is a very popular and decorative article for the home. It also makes a handsome and inexpensive gift. You can see a great many sconces of different styles in gift shop windows."

FIG. 2.

FIG. 3.

FIG. 4.

Second, materials, design, etc.: Teacher—"You may make a pair of sconces like the drawing on the blackboard" (Fig. 1) or "Here is a pair of sconces" (showing models) or "Here is a picture of some sconces which were made by seventh or eighth grade pupils" (showing magazine). "The back is made of a piece of half inch wood. The socket is made of a piece of wood 1⅜ inches by 1 ⅜by 4½ inches. These are fastened together with a small piece of dowel rod. You may make the back piece in the shape of a shield choosing one of the following designs" (Figs. 2, 3 and 4).

Third selection: Teacher—"Make a full-sized working drawing of three views, top, front and right side (Fig. 5) and plan design as directed."

Trace front view of back piece on thin transparent paper and draw a margin line ⅝" inside of outline. Draw a parallel line ⅛" inside of this. Add the outside and inside lines as shown in (Fig. 6) to give variety, following the structural lines of the piece. Break these continuous lines up into a stencil. Transfer on to mechanical drawing paper and cut with sharp knife or safety razor blade. Plan simple line design for socket.

The working out process is covered by the following instruction sheet:

Instruction Sheet for Sconces

Materials: ½" pine or white wood, 1½" pine or white wood and some dowel rod.

Steps:

Back Piece

(1) Select ½" white wood and rip off piece 4¼"x 14¼".

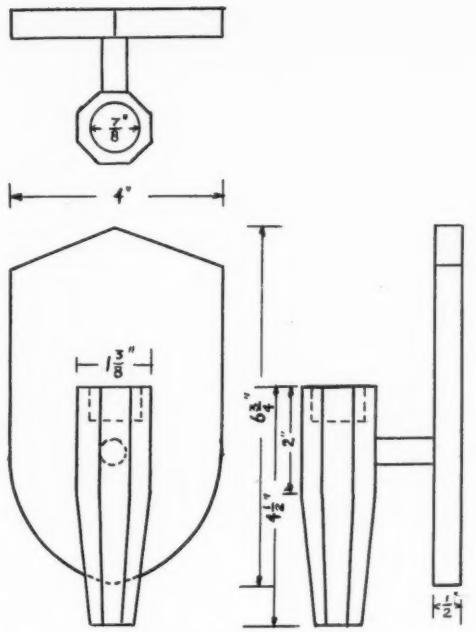


FIG. 5.

(2) Plane working edge and mark with pencil.

(3) Select best side and mark for working face.

(4) Gauge for width of 4" and plane to gauge line.

(5) Lay off with knife from one end the following dimensions: ¼" for waste, then 6¾"; then ¼" for waste, and again 6¾".

(6) With trysquare carry these dimensions all around the piece.

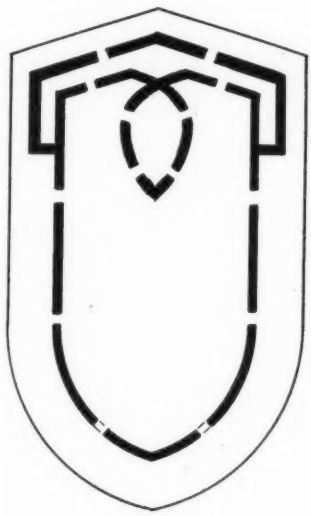


FIG. 6.

FIG. 7.

(7) Place the piece against the bench hook or in miter saw with saw turned to zero. Saw squarely across piece with the saw on waste side of each mark.

(8) Trace front view of back piece and cut pattern.

(9) Place pattern on each side piece and draw pencil line around same.

(10) Place pieces in vise and plane to pattern line.

(11) Lay out hole for dowel rod on center line of piece, 2½" from bottom and bore hole to depth of ¼" using a ½" bit.

FIG. 8.

Socket

(1) Rip off piece of 1½" wood, 1½" by 5".

(2) Square up with plane and trysquare to 1⅜" by 1⅜" by 5".

(3) Lay off with knife from one end the following dimensions: ¼" for waste, then 4½".

(4) With trysquare carry these dimensions all around piece.

(5) Place the piece against the bench hook or in miter saw with saw turned to zero. Saw squarely across piece with the saw on waste side of each mark.

(6) On one end draw the diagonals of the square and lay out octagon.

(7) Carry the points of the octagon with a gauge along the length of the piece.

(8) Place in the vise and plane square stick to octagonal form.

(9) Measure from the same end 2" and carry this measurement around the piece with the trysquare.

(10) Find the center of the other end by means of diagonals and draw a circle ¾" in diameter.

(11) Place in vise and plane each side of the octagon from the 2" measurement to the circumference of the small circle for taper.

(12) Finish each end with a ⅛" chamfer all around.

(13) In the larger end bore a hole to the depth of ⅝" with a ⅞" bit.

(14) Lay out the hole to take dowel rod in the center of one of the octagonal sides 1¼" from the top and bore hole to the depth of ½" with a ½" bit.

Dowel Rod

(1) Cut piece of ½" dowel rod 1¾" long.

(2) Assemble by gluing.

Finishing: Decide upon color harmony. Paint sconces some neutral color for background. Allow to dry and place stencil in position. Proceed to finish as described in article on book ends.

We can now purchase ordinary tallow candles and paint same to harmonize. (Fig. 7.)

The sconces and candles shown in Fig. 8 were painted black and stencilled with gold.

There is no limit to the possibilities for originality in handling this project.

The following method is a neat way of hanging the sconces on a wall:

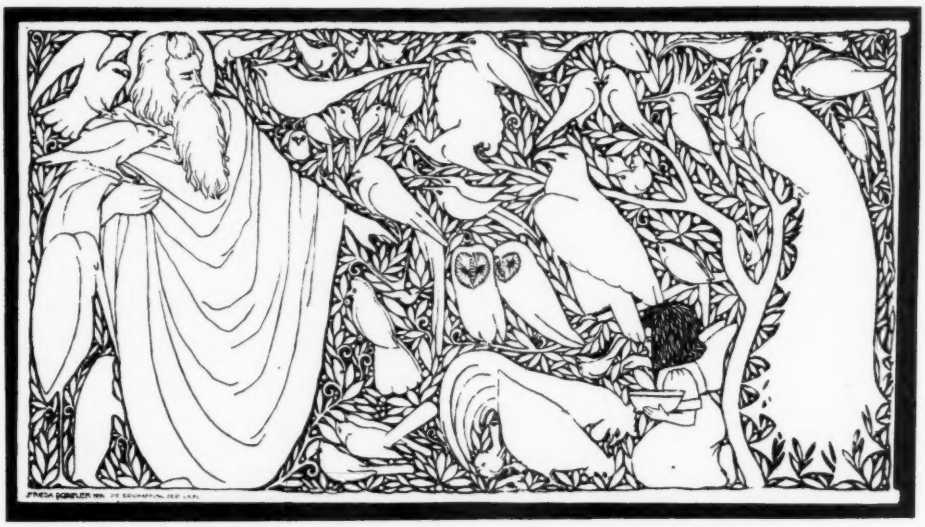
(1) Locate a point on the back of the sconce about one inch from the top and in the center.

(2) Drive a wire nail in an upward direction to a depth of about half the thickness of the wood.

(3) Pull out the nail leaving a hole with an upward slant.

(4) Select a small brad which will not mar the wall and drive same in the desired spot.

(5) Hang sconce by allowing the projecting head of the brad to slip into a hole in the back.



THE CREATION OF THE BIRDS, BY FRIEDA DOERFLER, AGED 14.

THE CIZEK EXHIBITION AT THE METROPOLITAN, NEW YORK

It is not easy for people who have never seen the exhibition of the works of Professor Cizek's children to believe in them or have any real conception of them. In Tunis there is a white wall and a gate in it and when you go through the gate you are in an entirely different world—a world full of color, movement and fabulous treasures exhileratingly free from the bourgeois standards which hold sway outside. You are in the Souks—you have stepped out of an ordinary European town into the East. You are in a world that is familiar to you. You visited it so often as a child in all the best loved fairy tales that now you feel strangely at home in it and you almost forget that it is real and not imaginary and you yourself a grown-up.

It is a similar experience to go into the Cizek Exhibition. There, also, you have gone through a magic door into a different world. You feel as if you were a discoverer and you want to run away and tell other people about it. You are transported into the world of children's fancies—you see their loves and their hates; what they find funny and what worthy of their respect; their pity and their worship. It is a world we have all inhabited at one time even if with less intensity than these gifted Vienna children: that is why we feel such a strange turmoil within us when we are transported into it suddenly without warning, and something of the nostalgie of exiles: why we weep as well as laugh. Here peeping out of every corner of colored picture, of wood cut and carved toy are the animals we used to know so intimately when we were children and from which we are so estranged as grown-ups; here the chuckles of delight at all primitive forms of fun—the red nosed man drinking, fat women being snow-balled—here the warm response to the sorrows of the poor, the naive unquestioning faith: all things which were once ours but which most of us have left behind putting them away amongst the childish things. "I confess to a hushed rapture on seeing these children's drawings" writes John Duncan, A. R. S. A., in the Scotsman, when the exhibition was visiting Edinburgh. "They have a wealth of good feeling in them, of awe and reverence, fun and courage and loving-kindness, that shames and charms and takes our very heart."

The Cizek Exhibition transports one not only into the universal world of children, it carries one to the heart of life itself. "If everything perishes out of the world except only this thing" cried a visitor to the Metropolitan Museum Exhibition, "what an amazing record of life it would be!" And this is true—all that future races need to know is there. Everything is in it—the festivals of the country people, the sordid life of the streets, the pomp of armies, the mysteries of the Church, the Madonna with the Holy Child, God the Father himself creating life out of chaos, the frolics of children, the smart life of the rich, the burdens of the poor, birds and beasts and flowers and the power of mountains and fields.

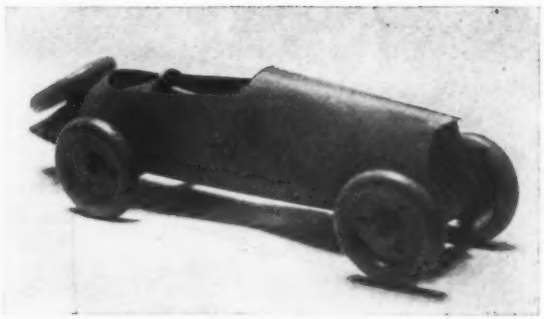
WOOD CUT BY BELLA VICHON, AGED 15.

That the young should lead us into this world should not surprise us for their life is more abundant than ours.

For Americans the intense local color of the exhibition gives it especial interest. Here they can see life as it was lived in Austria before and during the war and in the terrible

COLORED STUDIES BY INE PROBST, AGED 14.

aftermath. They can learn far more about this part of Europe than by long perusal of history books and guides—more than if they visited Austria themselves. All the sun of Southern Europe is in these pictures, all the unabashed color, the jolly life that is lived with wine and song. Something is here, too, of the anguish of a conquered nation. There is a picture by a boy of twelve of a dark procession of people with the red banners of revolution unfurled over them. There are drawings of wood gatherers, old men and women and young children returning to their homes in Vienna, their backs bowed with the wood which they have hacked themselves from the forest. But even in the pictures painted after the war the predominate note is gay, for youth is invincible and poverty and under-nourishment are not enough to break its spirit or deprive the world of color and amusement.—*Francesca M. Wilson.*



THE CAR READY FOR USE.

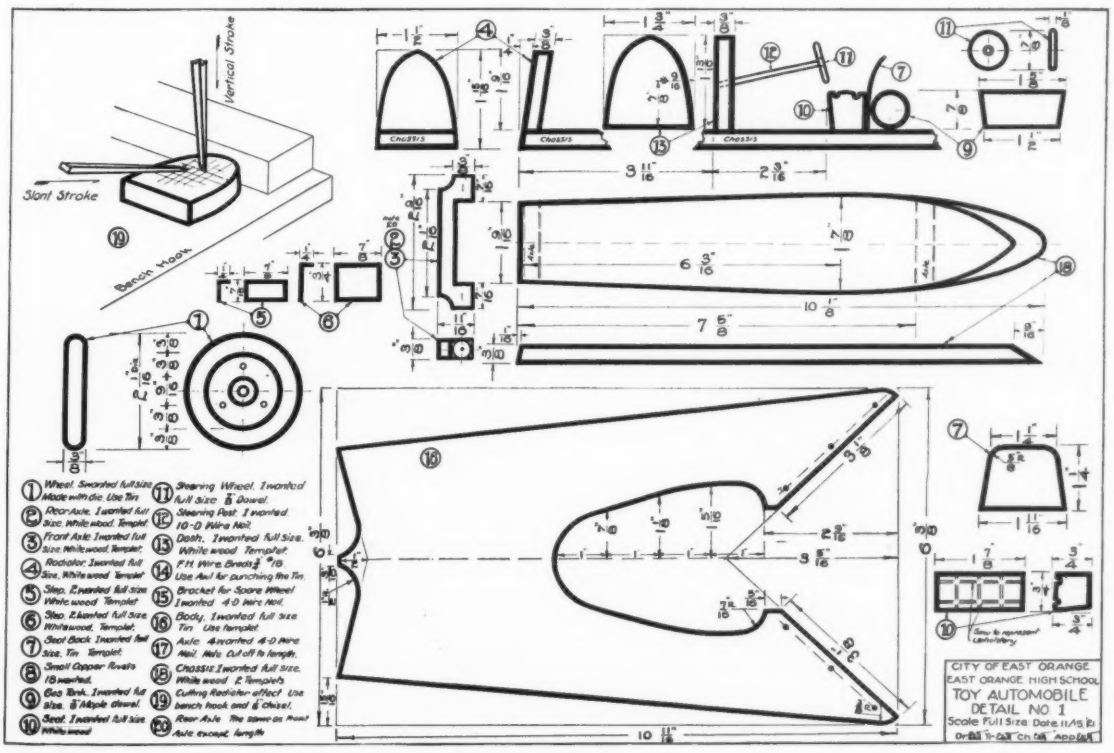
TOY AUTOMOBILE.

E. W. Tuttle, Director of Practical Arts, East Orange, New Jersey.

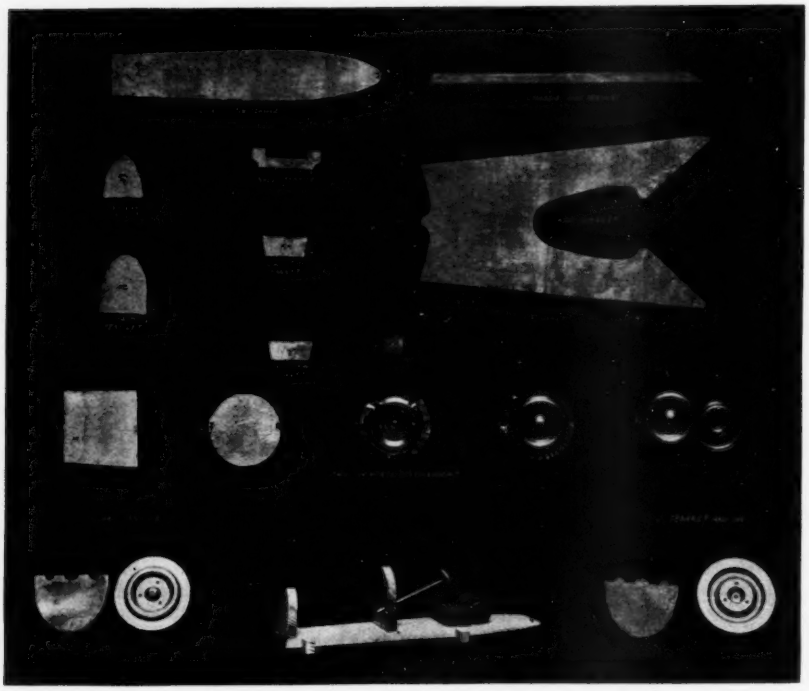
The toy automobile, illustrated in the accompanying drawings and photographs, was worked out in the seventh and eighth grades in East Orange, and is submited here because of its unusual success and popularity.

While teachers of manual training are constantly looking for new projects, it has been found in the East Orange schools that activities other than wood working are most popular and offer a wider variety of educational and industrial values than wood working. Sheet metal work has been carefully considered and has been found particularly satisfying.

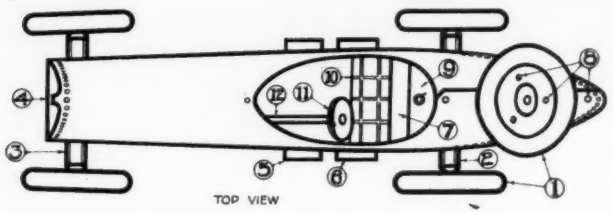
The making of tin-can toys has passed but not without having served a valuable purpose. In building up courses in sheet metal work and adapting projects of the sheet metal type to general manual training, some toy making is useful.

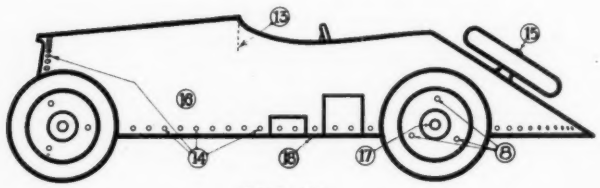


DETAILS OF A TOY AUTOMOBILE.



PARTS OF A TOY AUTOMOBILE.





Expensive equipment is unnecessary, especially in the elementary schools. We all have soldering outfits, tin, snips, pliers, iron vises, etc. Then all there is to do is to select several projects, adapted to the various grades, and build the models, and as we work we save our patterns, cut them out of tin, and put them away for later use by the boys as templets. Great care is exercised in selecting the sequence of operations which must be marked or numbered accordingly.

Wheels have always been hard to make, and in many cases, splendid toys have been badly mutilated by ill-shaped wheels. Those who have a machine shop need look no further for wheels. Dies are made in the machine shop, and you will not only have solved the wheel problem, but you will have given the young machinist a real live job. Mr. Clyde Sawyer, the high school machine shop instructor, recognized the splendid opportunity involved in die-making and through his efforts, the elementary shops have been supplied with very useful dies.

The instructor who is thoroughly convinced that the use of dies, templets and jigs is educationally worth while should not hesitate to work out problems involving dies and other articles which cannot be made without their use: It would be unfair to expect an entire class to select one project but our experience has shown that three projects at most, of similar construction, may well be offered a class so that some individual choice is possible.

The toy racer illustrated was worked out because it is economical in material, attractive in appearance and simple in construction. Boys are naturally interested in automobiles and are always glad to make one if only for a younger brother or sister. The material used in the racer illustrated includes one Wesson oil can for the body, three larger tomato cans for wheels, and wood for the radiator and seat, gas tank, axles, and steering wheel. The actual cost of one racer including the above, does not exceed ten cents.

The real problem in making a racer is the wheel construction. This involves the making of dies and their use.

VOCATIONAL EDUCATION IN DETROIT

The annual report of the Detroit school system gives an accounting of the work done in vocational education. The applied art course was introduced in fifty-two platoon schools and supervision of applied arts was extended to include the girls' technical courses in design in the intermediate schools and all of the art work in the Cass technical high school.

Bookbinding and book repair work was carried on in the elementary schools. Over 60,000 books were repaired. Printed courses in boys' construction work, bench work in wood, household mechanics, machine shop practice, electrical work, auto mechanics, pattern making, mechanical drawing, domestic art and domestic science were prepared and supplied to all the teachers.

During the months of October and November of last year some 2500 toys were made by the boys in the manual arts classes in the elementary schools and distributed by the Junior Red Cross to unfortunate children in the hospitals. The girls' classes made over 5,000 garments which were also distributed by the Junior Red Cross.

Considerable progress is noted in the direction of vocational information and guidance. During the year twenty-eight counselors and teachers, and thirty principals took courses in vocational guidance provided by the University of Michigan. A large number of occupational surveys in the industrial, commercial and professional field were conducted. These investigations and analyses resulted in a wide range of useful information pertaining to such pursuits as metal-working trades, building trades, telephone operators, clerical positions, wholesale drug industry, dentistry, nursing, social service, library work, restaurants, baking, printing and publishing, and the like.

THE ORANGE CRATE AND CANDY BUCKET BIRD HOUSE—I

C. Anthony Van Kammen, Grand Rapids, Mich.

In the May, 1923, issue of Industrial Arts Magazine was printed an article, "The Orange Crate and Manual Training," in which were named many useful things that could be made from the discarded carrier. Let me introduce another receptacle, the candy bucket, that serves admirably with the orange crate in housing our feathered

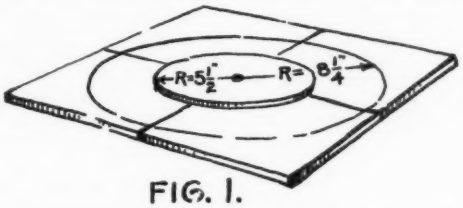


FIG. 1.

friends, be they martin, bluebird or Jennie wren. Candy buckets can be had at any store where bulk candy is sold. The author has designed and built several types of candy bucket bird homes, all of which have proved practical and serviceable.

The simplest type of construction is that shown in Fig. 4, in which the bucket is kept in an upright position. The interior is divided into two or four compartments by the use of orange crate ends, and the proper sized holes are bored for entrances. A ⅞" hole is bored for wrens. For blue birds the entrance is made 1½", which can be cut with an expansive bit or a compass saw.

A removable top, to which the roof is attached, is made from five orange crate ends. On one end piece draw diagonal lines. Using the intersections as a center, with a radius of 5½", scribe a circle and cut to the line. Place the other four crate ends each with a corner at the center of the circular piece and nail to that member. Using the same center as before, with 8¼" as radius, scribe and cut built up piece into a circle. See Fig. 1. This circular top, the base for the roof, will now extend 1½" all around the upper edge of the bucket. Nail the top in place with the small circular piece up. The nails

FIG. 2.

need not go deeply into the bucket as they are to serve only as locating pins to prevent the top from moving. The assembled roof is held to the main part of the bird house with four small hooks and screw eyes. See Fig. 2. The center support for the roof is built up from three pieces of orange crate end material ⅝"x1⅞"x8", making a square

FIG. 3.

shaft which, after being pointed, is toe nailed in the center of the top. Bevel the edge of the top at such an angle that a line from a point eight inches above the center will pass through the lower edge. The proper angle to point the roof support as well as the bevel on the circular top can readily be determined by a scale drawing. A ½"-hole bored through the top into each compartment and several holes the same size, ¾" from the edge around the rim, will furnish ventilation.

It is necessary to put a ¾" strip of crate end material from the slant of the pointed shaft to the edge of the circular roof base so that there will be a firm place beneath the roof for nailing the seam of the roofing material. Mark its location on the shingles covering it and also on the body of the bird house.

The roof boards or shingles are cut from the thin stock of orange crates. Four sections or shingles are cut from each piece of material which averages 5" wide. The layout for the shingles is as follows: Draw a line through the center of the piece lengthwise. Measure off 18". Draw a diagonal through each of the 2½"x18" rectangles formed and saw on the lines. Each section of roof is longer than required but is cut to length after nailing in place because it is necessary to shift the points at the peak when fitting the sections. Five-eighth No. 20 gauge box nails are used for fastening the shingles. The length of the shingles will determine the size of the piece of roofing material needed. The shape of the piece can be de-

FIG. 4.

FIG. 5.

FIG. 6. FOR RENT.

termined by developing the surface or by laying a newspaper over the roof and cutting a pattern. A finished shingle should be about 16" long. Over lap the seam not less than three-fourths of an inch. A copper cone can be made to cap the peak.

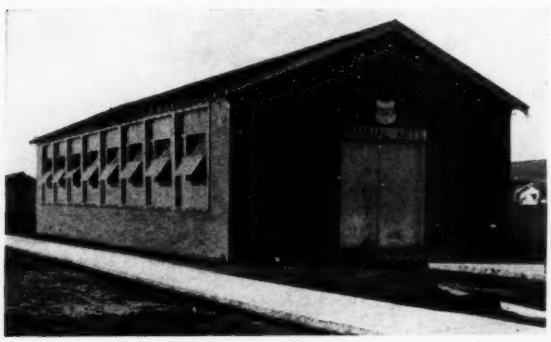
If the house is of the hanging type, a pendant may be turned for the base, Fig. 3, or an embroidery ring can be attached at the center as a perch for the tennants, Fig. 4. For the house that is to be placed on a pole or shaft a 2"x4"x14' 0" is used, on the center of the broad sides of which are nailed strips 7/8"x1 7/8"x14' 0". Brackets or braces are nailed at the top of the shaft to help support the house, see Fig. 5. Fig. 6 shows a photograph of a completed house which was occupied by bluebirds twelve days after being placed. It is suggested that no perch be made near the entrances as the English sparrow causes much trouble by "parking" on them.

(To be Continued.)

FROM OKLAHOMA

Supt. P. C. Smith, Hominy, Okla.

Nestled snugly in a beautiful valley in the Osage hills is a town of some five thousand inhabitants, in many respects like other Oklahoma towns, and yet, different—different because you see no signs of the usual oil town. It has a classic beauty all its own and, walking through the streets, you observe quaint Indians with the "far-off" look so noticeable in the faces of so many American Indians. The Indians are Osages, large men and women with square, well-set jaws, the wealthiest people per capita in the world. Their children attend school with the white children of the town, and the wealth of the white and red people alike goes to support an excellent school system, one of the best to be found in a town of any size in the state.



THE SHOP READY FOR USE.

When the board of education at Hominy attempts to do a thing it is done with very little discussion. During the past summer in addition to their excellent school plant, they decided to put in an up-to-date manual arts building with the latest equipment. The building and equipment were secured at a cost of seven thousand dollars and one of the best manual training teachers in the state has been secured to head this department which is now one of the most popular in the school. Provision is made for all kinds of woodwork as well as automobile repairing and shop crafts usually found in good schools.

Mr. S. L. Caldwell, who for a number of years held like positions in some of the large state normal schools, was secured to take charge of this department. His students are turning out some excellent work and are to be found both busy and happy at any hour you may visit their shop. They are happy as all are happy when they have something in which they stamp their own personality. And, because of that personality, money can scarcely buy the cedar chests, center tables, lamp stands and other articles made by these boys for happy parents.

INDUSTRIAL WORK IN THE COLORED SCHOOLS OF MONTGOMERY COUNTY, ALABAMA.

A description of the industrial work carried out in the colored schools of Montgomery County, Alabama, during the year 1922-23 has recently been issued by the assistant superintendent. The work which was organized on the project basis, provided for the first month a hot bed project with the beginnings of gardening at each school. The hot beds and gardens were for the purpose of offering instruction in preparing home gardens, with the child's garden as the main objective.

The projects for the second month were axe handles for boys, and handkerchiefs and aprons for the girls. The third month was designated as shuck month. Mats, horse collars, whisk brooms, chair bottoms, book sacks, lamp mats and napkin rings were the problems undertaken. The garden work was a standing project for each month for the entire term of six months.

Of the 70 colored schools operating in the county, reports were received on the work in 67 schools. A summary of the work is as follows:

67 schools reported 67 hotbeds at schoolhouse.
63 schools reported 1486 hotbeds at homes of children.
65 schools reported 2412 home gardens.
67 schools reported 1753 axe handles made.
66 schools reported 2461 handkerchiefs made.
60 schools reported 771 shuck mats made.
39 schools reported 222 horse collars made.
55 schools reported 269 chairs bottomed.
60 schools reported 1195 whisk brooms made.
65 schools reported 965 book sacks made.
60 schools reported 936 lamp mats made.
58 schools reported 962 napkin rings made.
60 schools reported 610 white oak baskets made.
45 schools reported 447 willow baskets made.
63 schools reported 839 shuck baskets made.
65 schools reported 1358 pine needle baskets made.
59 schools reported 663 pine burr baskets made.
66 schools reported 1359 aprons made.
62 schools reported 1200 table napkins made.
40 schools reported 223 rugs made.
59 schools reported 401 pillow tops made.
49 schools reported 333 window curtains made.
66 schools reported 699 chicken coops made.
60 schools reported 1125 gate latches made.
62 schools reported 1775 articles made otherwise than above enumerated.

Much credit for the excellent showing of the pupils this year is due Miss Lillian Dabney, supervisor of industrial education for the schools of the county.

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, pattern-making, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

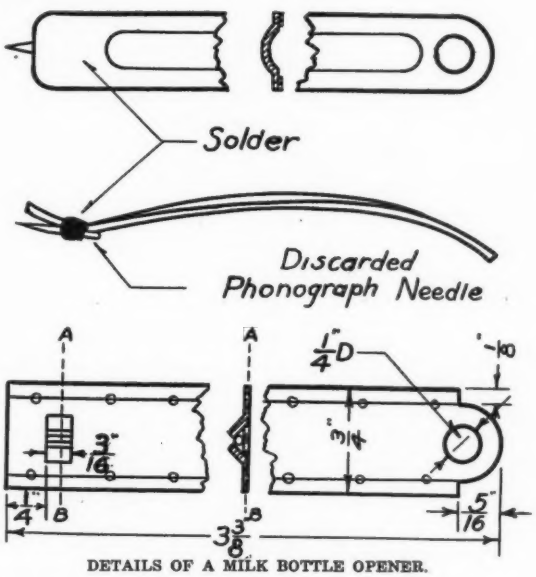
MILK BOTTLE OPENER

Frank W. Walsh, State Normal School, Oshkosh, Wis.

A useful little article for the kitchen is shown in the accompanying drawing. It can easily be made as an extra problem by boys in a general shop class in manual training or a regular sheet metal class. It is made of scraps, so the cost is practically nothing.

From a scrap piece of medium weight sheet metal (preferably galvanized) cut a piece the desired length. Punch a round hole the size called for in the drawing or large enough to go over the head of a nail at one end of the piece. Punch out the hole by placing the piece over a round hole in an iron plate.

Run a center line on the piece, then lay out the whole pattern. Fold on the folding lines and trim with shears. Roll in the bead, or if necessary, hammer in with rounded tools.

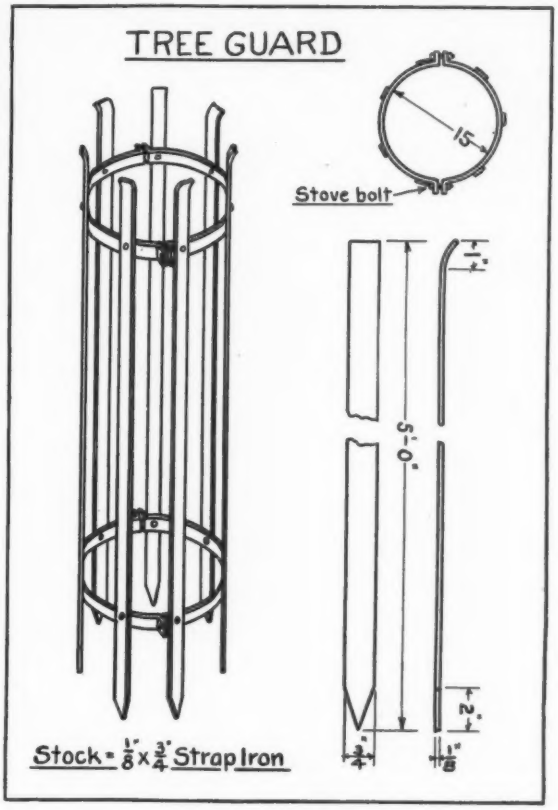


DETAILS OF A MILK BOTTLE OPENER.

Cut a slit near the other end from the round hole. This slit can be cut with a narrow chisel or a spike made to a wedge shape. It should be pushed out on the bottom side far enough to receive a phonograph needle. Slip the needle in as shown at AB, allowing the point to extend past the end of the piece. This should be bent up just a little so that the cap of the milk bottle wedges between it and the needle.

Solder the needle as shown and smooth off all rough corners with a file.

The design may be varied by making the bead the other way or by not going to the trouble to fold under any metal at the edges.



A TREE GUARD

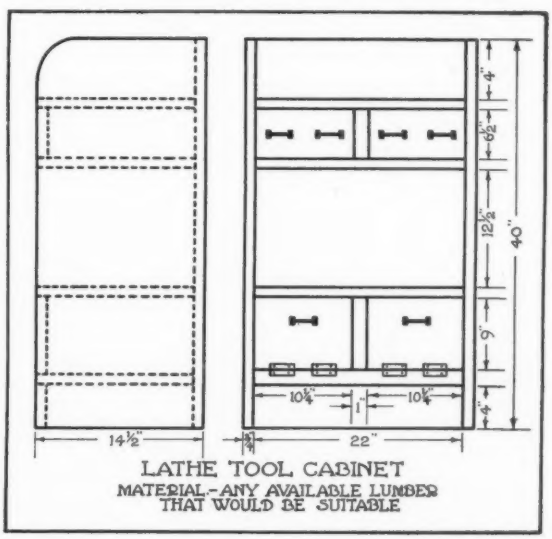
E. L. Moore, Connersville, Ind.

This problem is equally useful in the rural high school as in the city high school. Frequently there are trees on the school grounds which can be protected with a suitable tree guard. The accompanying drawing is complete in the dimensions and in the discussion concerning the stock to be used.

LATHE TOOL CABINET

Emery Smith, Three Rivers, Mich.

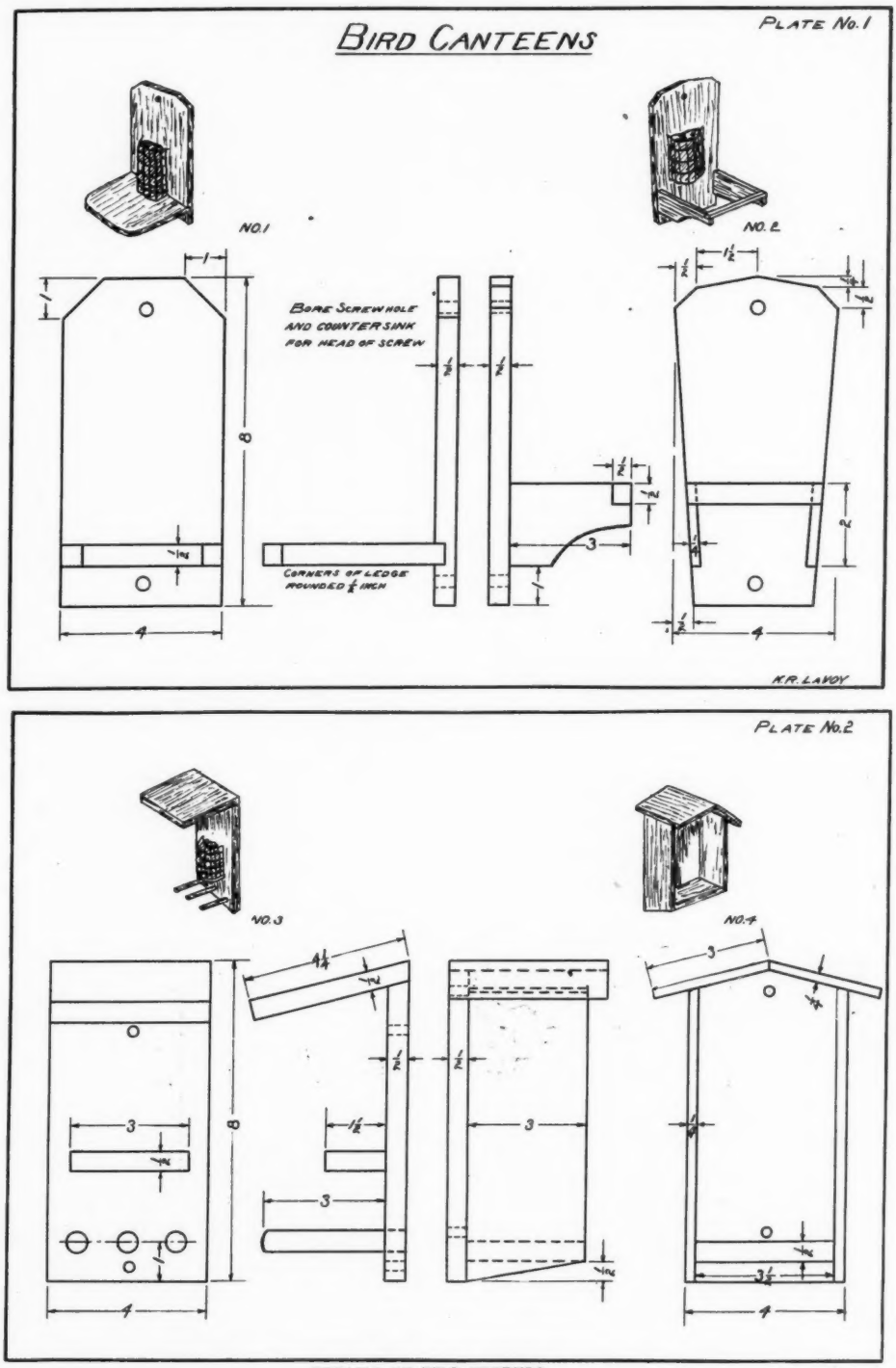
This cabinet is a handy piece of shop furniture in which to store tools, chucks, and other articles which are constantly used on the large machine tools. The cabinet may be made of wood, but is better made of sheet metal,



preferably a fairly heavy sheet steel. The doors at the bottom should be made with a spring hinge to close automatically.

The cabinet will add to the systematic and orderly appearance of the school machine shop, and will save time for students and teachers.

accompanying drawings of bird feeders, or "bird canteens," as they might be called. Each feeder is equipped with a suet holder made from rabbit wire by the boys themselves. Placed in a sheltered position on a tree or building, and kept filled with beef or mutton suet through the severe winter months, they will help in keeping our



DETAILS OF BIRD FEEDERS.

BIRD CANTEENS

Kenneth R. LaVoy, New Rochelle, N. Y.

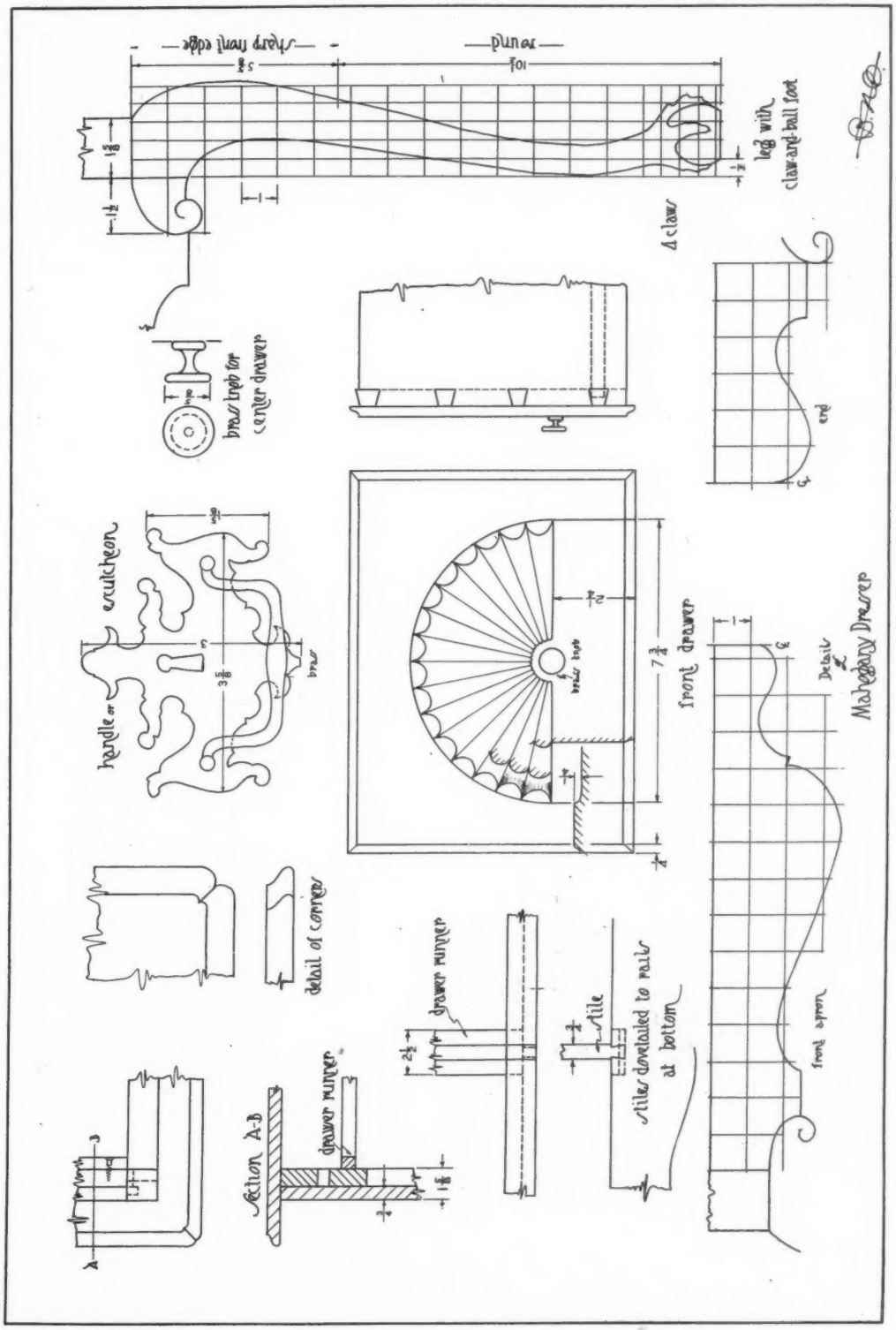
Useful, instructive, and interesting problems for elementary work in manual training are offered in the

feathered friends from starving. A good mixture for the holders may be made by melting the suet, then adding dry ground bread, meat, poppy and sunflower seeds, and millet. This mixture should be well stirred, and then

allowed to cool and harden, after which it is cut into suitable sizes for the holders.

The tool processes and the construction of the feeders are such as to make them suitable projects for the fifth or sixth grades. They offer good practice in sawing and planing, and some simple joinery. Problem No. 1 is planned to have the shelf fitted into the dado in the back. This dado affords good exercise in chiseling. Getting out the shelf requires the planing of curves.

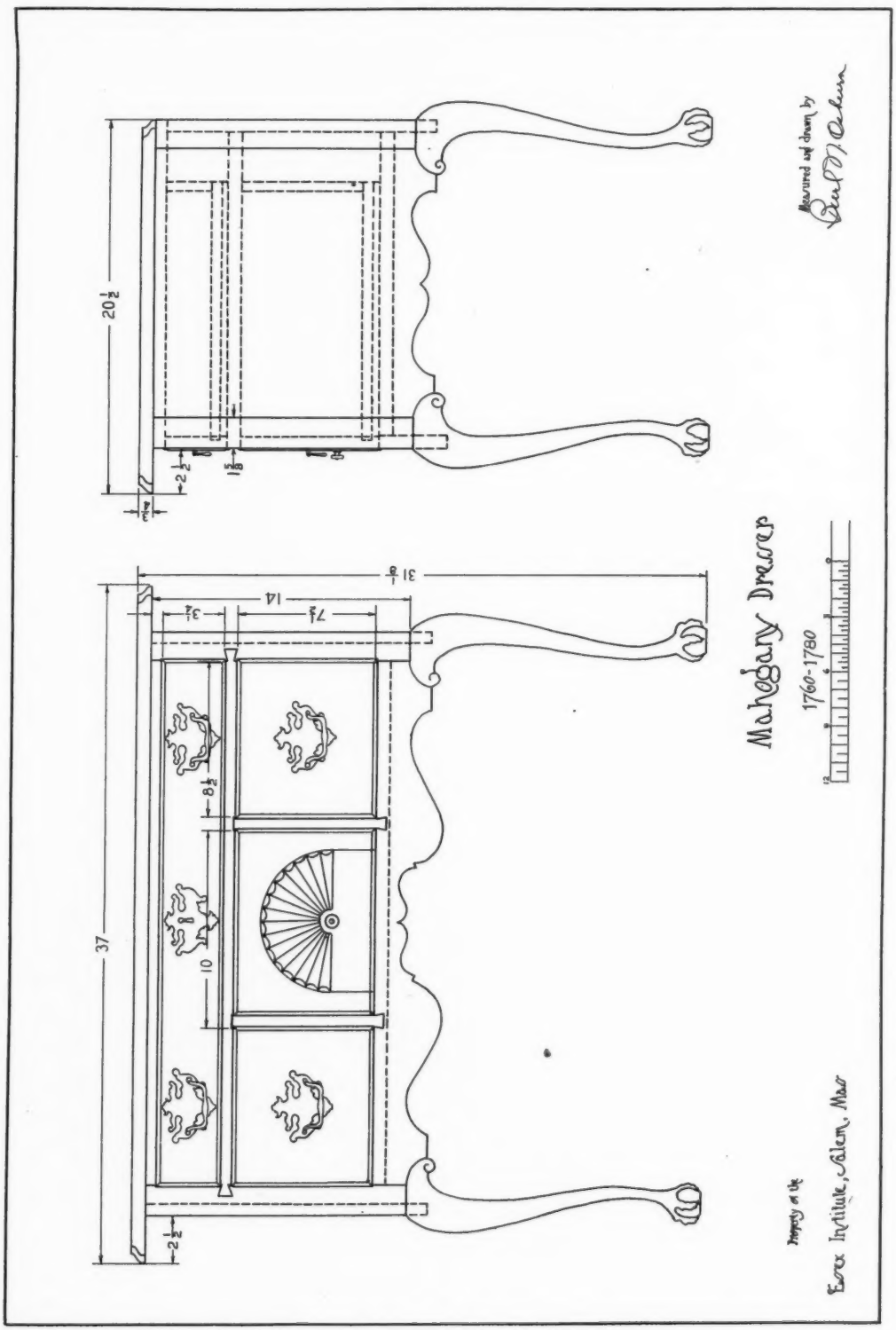
In Problem No. 2, the planing of the back demands careful attention to the grain. The use of the coping saw is covered in getting out the side pieces. The perch requires careful fitting to make a neat job.



Feeder No. 3 brings in the use of bit and brace and the proper method of boring, in boring holes for the dowel perches—also the planing of curves in getting out the piece for the suet holder.

Problem No. 4 demands more skill in assembling than do the other problems, but does not offer such a variety of tool operations.

In the fall and early winter these feeders are a timely and satisfactory problem. Aside from their value as a wood working project they afford an opportunity of arousing the interest of the boys in birds, and of teaching them the value of bird life to a community and to mankind.



MAHOGANY DRESSER

Burl N. Osburn, Sioux City, Ia.

The dresser, or case of drawers, is popularly known as a "Low Boy." It first appeared about 1690 and came rapidly into favor. It was used as a serving table and carried the silver and glassware. Examples extant today are made of pine, walnut, cherry, maple, mahogany and other woods.. The construction is similar to modern practice except in a few cases. Among these are the visible mortising or dovetailing of the rails into the legs and the stiles into the front apron; the sides are flush with the face of the legs instead of being set back as is common now. The center drawer is carved into a sun-burst with a brass knob used as the center of radiation. The legs are formed by gluing blocks on a 1⅝" piece to form the cabriole and the ball and claw feet.

Stock Bill

Number pieces	Name	Cutting sizes T.	W.	L.
4	Legs	1¾	1¾	32
1	Top	⅞	20¾	37¼
1	Front apron	⅞	3½	32
2	Ends	⅞	16	16
1	Back	⅝	14½	32
2	Front rails	⅞	3	32
2	Stiles	⅞	3	8½
1	Top drawer front	⅞	3½	32
2	End drawer fronts	⅞	8	9
1	Center drawer front	⅞	8	10½
6	Drawer runners	⅞	3	18
8	Drawer guides	⅞	2	18
1	Drawer bottom	½	32	14
2	Drawer bottoms	½	8	14
1	Drawer bottom	½	10	14
6	Drawer sides	½	8	14
2	Drawer sides	½	3½	14

HOLD ANNUAL GET-TO-GETHER BANQUET

Boston Club's Successful January Meeting

Good fellowship was the keynote struck by President M. Norcross Stratton at the 1924 Get-To-Gether banquet of the Boston Vocational Education Society held Saturday evening, January 12, at the Hotel Bellevue. This fraternal spirit was predominant throughout the program—in the serious as well as the strictly entertaining parts of the program.

Musical entertainment and an address by Mr. Charles S. O'Connor were features of this very enjoyable occasion. Mr. O'Connor, formerly a member of the Boston School

MR. CHARLES S. O'CONNOR,
Boston, Mass.

Committee and a recent mayoralty candidate, delivered an address on the subject of Patriotism and Opportunity.

He cited the opportunity the vocational instructor, and especially the continuation school instructor, has in the way of establishing relationships of good fellowship and understanding with his boys. Most tradesmen teachers have been trained said he, in the university of the world and the college of hard knocks and are thereby more adequately prepared to point out the ways to the lad who is in the same university or will soon be so.

Lincoln, he told the Society, should be their patron. He, in his life, exemplified the spirit of brotherly love and understanding of the dignity of labor which should actuate the teaching in vocational and continuation schools.

Pleading for the utmost constancy and fidelity on the part of teachers in vocational classes and lauding such as a "work of the heart" he reached the climax of his inspiritional address when he cited the sorrow of the Master in the garden when he called to his sleeping disciples "Could ye not watch one hour with Me?" This he concluded is the task of our instructors to carry on and watch the full hour until the task is complete.

After his speech a rising vote of thanks was extended to Mr. O'Connor and this with the many individual comments heard made it certain that Mr. O'Connor's speech had struck a responsive chord in the hearts of his audience.

As the French say, it's only a step from the serious to the frivolous, and Mr. George Hatch took the lid off things when he led the banqueters in community singing from "Yes, We Have No Bananas" to "In the Good Old Summer Time." Then followed the regular entertainment program which consisted of selections by the Vocedso Quartette: Charles M. Doherty, tenor, Joseph Gildea, second tenor, Francis L. Bain, baritone, and Louis Karshick, bass. Bass solo, "Sea Song," by John C. Brodhead; baritone solo, "Mandalay," by Francis L. Bain; tenor solor, "Mother Machree," by Charles M. Doherty.

Besides the regular entertainers there were no end of impromptu glee clubs at the various tables, who, spurred on by George Hatch, competed for the applause of the other banqueters. Mr. Joseph Gildea was at the piano. Toy balloons and other favors were distributed which together with the vari-colored "degree" hats added to the carefree spirit of the latter part of the evening.

The whole affair was a wonderful achievement. Good fellowship predominated throughout. Although the complete success of the banquet was due to the fine fraternal spirit of everybody, yet most praise should go to the Entertainment Committee and its Chairman, John L. McCarthy. This committee is planning a ladies' night soon.

—John I. Lusk.

WHAT NEW YORK SAW IN THE MID-WEST

Distinguished Educators Visit Continuation School at Milwaukee

When a group of prominent educators travel a thousand miles to visit a single school, the inference must be that they were actuated by a tremendous zeal and that the objective was worth the effort.

The high school officials of the city and of the state of New York clapped down their desks one day last month and made a flying trip to Milwaukee to spend a day at the big central continuation school in operation in that city.

The journey had its inception in the desire on the part of the New York City school authorities to extend the partly begun vocational education plans of that city. Lewis A. Wilson, state director of vocational education of the state of New York, suggested that Milwaukee be visited and in this suggestion had the support of Dr. Frank P. Graves, the state commissioner, who joined the party.

The members of the party that engaged in the inspection journey were the following: George J. Ryan, President, Board of Education, New York City; Dr. William L. Ettinger, Superintendent of Schools, New York City; Dr. Frank P. Graves, State Commissioner of Education, Albany, New York; William J. Weber, member, Board of Education, New York City; John E. Bowe, member, Board of Education, New York City; Mrs. Margaret McAleenan, member, Board of Education, New York City; Miss Margaret J. McCooey, Associate Superintendent of Schools, New York City; Dr. Edward W. Stitt, Associate Superintendent of Schools, New York City; Dr. Edward B. Shallow, Associate Superintendent of Schools, New York City; Dr. George H. Chatfield, Assistant Director of Attendance, New York City; Joseph Miller, Jr., Secretary, Board of Education, New York City; Lewis A. Wilson, State Director of Vocational Education, Albany, New York; Oakley Furney, Supervisor of Continuation Schools, State Department of Education, Albany, New York.

What the Party Saw

The members of the party were in the main informed of the general character of the big central continuation school located at Milwaukee, but it was believed that a first-hand inspection and direct answers to the many questions which had arisen in their minds would serve most practical.

GROUP OF NEW YORK EDUCATORS.
(Left to Right): President George J. Ryan, Board of Education; State School Commissioner Dr. Frank L. Graves; Superintendent Wm. L. Ettinger, New York City Schools.
Miss Margaret J. McCooey, Associate Superintendent, and Mrs. Margaret McAleenan, Member, Board of Education.

They found a monster structure covering a large city block, equipped with all sorts of machinery at which thousands of young men and women were at work. Here the buzz and whirr of industries including iron and woodworking, textile, and leather, printing and binding, etc., etc., was heard. One hundred and sixt-eight instructors were directing the work of the students.

These students are all employed in the factories, shops and offices of the city. Being between the ages of 14 and 18, they come under the compulsory attendance act. Something like 18,000 young people must attend this school for at least eight hours a week.

The state on the one hand, makes liberal provision for the maintenance of the school, and on the other exacts attendance. The school found its origin in the thought that youth between the ages of 14 and 18 must either go to school or go to work. But, those who go to work must also go to school for part time in order to make them better citizens and more intelligent workers. Loafing is positively discountenanced.

Prof. Robert L. Cooley, who presides over the big continuation school, reasons that the larger fraction of the youth between the ages of 14 and 18 does not attend an all-day school. It is to this army of boys and girls, which in Milwaukee numbers something like eighteen thousand, that the attention of the continuation school authorities is directed.

He illustrates the "earning while learning" idea in the following manner: The all-day high school student costs the school system $250 annually, or $1,000 in four years. During this period his earnings are nil.

Attending a part-time continuation school, the student entails a cost of $50 a year or $200 for four years. During the period he earns, 1st year $500; 2nd year $600; 3rd year $700; 4th year $800, or a total of $2,100. The total earnings of the continuation school students at present are $4,000,000 annually.

The New Yorkers found that the Wisconsin continuation schools are under state control with local boards to direct the immediate operations. These local boards are made up of two labor representatives and two employers, the fifth being the superintendent of schools. The board thus constituted is entirely independent, and levies its own taxes up to one and one-half mills on assessed valuation of the community.

What the New Yorkers Said

State Commissioner Frank P. Graves said: "Milwaukee and Rochester, N. Y., have the best developed systems of part-time education in the country. Mr. Cooley is regarded as one of the great leaders in this work in the United States. Part-time education is recent in New York compared with Wisconsin. Our law was passed in 1919. Wisconsin has had such a law for twelve years. The Milwaukee vocational school is a model and the most complete in the country.

"We are much pleased with what we have seen here, more specially with the orderliness. Everything moves like clock work. The care given to individual cases, so necessary in part-time work, is interesting, and is a special subject of our study."

President George J. Ryan, in commenting on the visit, said: "Neglect of past administrations has brought about a situation in New York City which has compelled us to delay promotion of part-time vocational education to provide buildings and equipment for elementary and high schools.

"The emergency we were forced to meet is almost beyond understanding and required an enormous amount of money. We appealed to the city government for relief and were granted $115,000,000 for new buildings. We have now under construction and planned 141 new school buildings. We are also promised that after this program is completed we will not be stinted for money, but will be given funds as fast as we can plan and erect buildings.

"We are constantly studying all branches of education, as New York City has to meet and solve school problems found in no other cities. The school board has seven members and the schools are under nine associate superintendents. The annual school budget is $98,000,000 exclusive of construction. We were told that Milwaukee has had eleven years' experience in vocational or part-time education and accepted an invitation of Dr. Graves, New York State Commissioner of Education, to visit it."

In the evening the party were the guests of William George Bruce, publisher of the Industrial-Arts Magazine.

THE SCHOOL CRAFTS CLUB MEETS
Interesting Addresses at January Meeting

The School Crafts Club held a regular meeting and dinner at La Maisonette, New York City, on Saturday evening, January 19, 1924. Following a splendid repast, warmed by an atmosphere of good fellowship, a short time was devoted to matters of business. Then the large group of men in attendance heard two instructive and interesting addresses.

Thomas Darling, secretary, read a letter from the School Arts League acknowledging our contribution to the Haney Scholarship Fund. Mr. Darling also read a letter from Mr. John J. Hatch, who desired to resign because he could no longer attend the meetings. This resignation was accepted with regret and a motion was carried to make Mr. Hatch an honorary member. A vote of thanks was extended to Mr. Charles D. Patrick for the Industrial Arts Tests for Diversified Work which he passed out to members at the last meeting. Mr. Patrick is developing a series of tests for different activities. Although the tests are yet in experimental form, several schools are using them, such as the Bayonne and Plainfield schools of New Jersey and the Lincoln school, New York City. Mr. Patrick is teaching shop work in Bayonne.

Prof. A. H. Edgerton of Teachers College spoke on the subject of "Curriculum Building in Industrial Arts for Secondary Schools," based on a survey of practices and objectives of 143 cities throughout the United States. Mr. Edgerton expressed great pleasure in speaking to a growing club which stands for the science of education. In curriculum building we may progress through the successes and mistakes of past and present. New courses must use the best phases of education to date. We must survey the best practices and weigh them against the interests of the community in question. Tendencies in the field of practice must be considered, listing types of work being done in the best schools, and listing things being made in classes by students. We must analyze the occupations represented in our industrial-arts shops and mere opinion must be overruled. Practice must not stand still.

Much has been said about utilizing the pupils' interest through the project method. The late Col. Parker of Chicago followed the project method in true form, allowing the child to do exactly as he pleased. Contrasted with this extreme in the use of the project method is the case where the teacher chooses the project to be developed by the child. We should survey what children are interested in doing and observing them by themselves in boy scout groups, summer camps, etc. What they read may be surveyed by the magazine and books they read. In a survey made by Mr. Edgerton of possible projects in shop work in industrial arts, the pupils' lists were identical by twelve per cent only with that submitted by teachers, while the teachers had on their lists seventeen per cent of the projects listed by pupils. These cases must be scrutinized to find out what the pupil is interested in making.

Mr. Edgerton spoke of a survey of individual judgments he had supervised in which 202 successful men in

professional, commercial and industrial life were interviewed as to the desirability, lack of necessity, and necessity of having pupils acquire different kinds of skill and knowledge listed in questionnaire form. He said:

"Although it is not claimed that these successful representatives are qualified to make suitable courses of study for secondary school children, it is believed that the judgments of those who will employ and become interested in the product of the schools, are of sufficient value to warrant careful consideration and comparison with other data. In other words, this is one of the important bases for checking our analyses in order that courses may reflect, to a reasonable degree, both the needs and interests of the learners concerned. This study was undertaken after preliminary analysis had been made to ascertain what related knowledge is considered either necessary or desirable as supplementary training in industrial intelligence for those secondary pupils who seek understanding of an insight into local industries as a basis for future promotion in industrial and allied callings, or who desire industrial perspective as a part of their training for leadership in business or industrial pursuits, or who wish an overview of the industries to better equip themselves for professional or semi-professional careers.

"**Factual Bases for Curriculum Building. Findings and Implications Resulting From This Study.**

"When one considers the wide range of occupations represented in this study, it is a significant fact that these professional, commercial, and industrial interests are mutually agreed as to the desirability or necessity of having our secondary school pupils acquire the different kinds of knowledge considered. The majority of the judgments of those surveyed were found to favor the following:

"1. That **technical knowledge** pertaining to the understanding of tools, machines, materials, operations, and principles involved, should be provided with special reference to the needed applications of each class, group, and individual concerned.

"2. That **vocational knowledge** pertaining to the conditions, processes, and relationships in present-day commerce and manufacture, should be provided through concrete experiences and related study.

"3. That **occupational knowledge** pertaining to the nature of work, qualifications and training, advantages and disadvantages, labor conditions, health problems, future opportunities, and the like, might well be provided in connection with the other studies as a basis for the intelligent choice of courses of study and life work.

"Furthermore, it is implied that the course of study which is designed to meet these obvious needs cannot be met by providing a mere textbook acquaintance of these closely related studies. In fact, a composite workshop and laboratory is suggested in order that a wide variety of materials, tools, and machines might be available for constant use and study. The general agreement on certain questions suggests that pupils should do a considerable amount of productive work of one kind or another that emphasizes the time element and accuracy of the commercial shop. Then, too, it is suggested that frequent visits should be made to large and small production plants to study methods of production, organization, and maintenance, where the limited school facilities can not provide the necessary facts. In any case, the various units of such a course would be expected to give proper consideration to the kinds and qualities of materials, the appropriate design and construction, the processes and operations of manufacture, the shop applications of science, mathematics and mechanics, as these related to the problems at hand.

"In conclusion, it should be pointed out that the large numbers of the 202 persons interviewed insisted that this type of purposeful education and training in the principles of applied science, mathematics and mechanics should provide for more rapid advancement in each occupation chosen. In some cases it was specified that these studies should include elementary organization problems concerning efficiency of management and the coordination of the various factors in industry. For example, such studies as building and equipment, purchase of materials, employment and supervision of workers, assembling and distribution of the products were suggested. In other words, those who are successfully engaged in professional, commercial and industrial occupations favor some sort of vocational emphasis in the senior high school, which is assumed where the 'self-finding' emphasis exists in the intermediate or junior high school organization."

Mr. Edgerton referred to the interest that is awakening among industrial-arts teachers in regard to related knowledge tests and practical tests. We should think of these tests as a means of finding out what students already know when they come to us. Then we should so build our courses to supplement this elementary knowledge. Courses should acquaint pupils with what they most need to know.

The Club also heard and saw that which will never be forgotten by those who were so fortunate as to be present. Mr. Berthold Audsley, model engineer of the Edison Lamp Works, gave a "Talk and Demonstration of Cardboard Construction as Applied to Model Engineering."

Mr. Audsley as a model engineer is one of the best, a man having international reputation. He followed the profession of architect for eighteen years in New York City, during which time he became so convinced of the need of good models in engineering. Mr. Edwin F. Judd, in introducing Mr. Audsley spoke of a four foot house which the latter had made of cardboard throughout to perfect scale. Construction and finish were perfect even to furniture and china ware in the dish closet. Photographs of the rooms of this house had the appearance of those taken of actual life size articles. Mr. Audsley's first project was a steam locomotive built entirely of cardboard. This piece of mechanism actually ran when completed, and the maker has it on display on his own living room bookcase.

The tools and materials for this work are few and easy to obtain: a large piece of plate glass and sharp knife for cutting cardboard, a straight edge, scale rule and a pot of gum arabic. It is essential for anyone to do this work that he be a good craftsman, able to handle a knife and straight edge, and understand decoration and the use of pigments in water color and oil. Hardly any wood is used. In all construction one must start from the inside and build outwards either way. All cardboard must be laminated properly with gum arabic. Properly constructed cardboard is very strong and a small cube built up by box construction will hold the weight of man without collapsing.

Mr. Audsley described the process by which he made a model iron girder, which he passed around. Although only twenty inches long, this girder had been tested to withstand a pressure of 168 lbs. This was built up entirely of cardboard and gum arabic, shellaced and painted black. Gum arabic is preferable to either liquid or hot glue for this work. Liquid glue is not strong enough, and hot glue thickens too quickly. The cardboard used mostly is ten sheet, although other thicknesses are used, dependent on the size of work to be done. Mr. Audsley's models take in all kinds of architectural and engineering work. He spoke of constructing a model of the Fortune Temple in England for the Shakespearian Club of Columbia University. No drawings were available and the only data on hand were descriptions. This gave an idea of the size and details. The model, beautifully rendered, is now on display at Columbia. Another project was a model needed to show improvements on an old stone bridge which had to come down. Both the old and new were illustrated in this way. The old bridge was a landmark.

Mr. Audsley spoke of a Mecca Temple he had just finished modeling from the plans. It took him four days to puzzle out one little detail in modeling a section of one part of a dome effect. Ninety-one layers of cardboard had to be cut mathematically correct before being cut on the plate glass with a surgeon's blade used for the purpose. Sectional models of Gothic doorways and stained glass windows were passed around by Mr. Audsley. Those viewing these were amazed at the intricate carving of modelings and friezes. The windows had figures in beautiful colors, all rendered to scale.

Mr. Audsley told of the making of a model for the Central Depot in England. This had to be completed in six weeks and to finish it he had to work 22 hours a day over this whole period, sleeping only between 4 a. m. and 6 a. m. On the three final days he did not sleep at all.

In building up modelings, these are put together geometrically of box construction. Then after shellacing to harden the cardboard, he used razor edged chisels for carving. Very fine sandpaper is used in smoothing up, 4-0 to 8-0. All corners have a step or overlapping joint between layers.

The following men were accepted into membership in the School Crafts Club: Mr. Emil F. Rolzhausen, Bayonne, N. J.; Mr. Kenneth L. McCulloch, Plainfield, N. J., and Mr. Osgood S. Kinsman, Flushing, L. I., N. Y.—**Lloyd F. Stair.**

THE VOCATIONAL EDUCATION ASSOCIATION OF THE MIDDLE WEST AT ST. LOUIS

The Vocational Education Association of the Middle West at its recent convention in St. Louis exhibited, under adverse conditions, a splendid vitality and earnestness, which the Middle West is accustomed to exhibit. What the meeting may have lacked in numbers it made up in enthusiasm, attention to the problems of its field, and understanding of conditions and opportunities.

The program was a treat. The subject for discussion represented a very comprehensive view of the recent growth of vocational education in the north central states and of the problems which this growth has brought with it. The speakers were in all cases representative men and women, and best of all, they came prepared to deliver real messages to a group which is fully abreast of the newest developments.

There was no evidence of further fear for reaction in vocational education such as was expressed a year ago in Detroit. On the other hand, there was much discussion of the new problems of apprenticeship which have developed from the shortage of skilled men in the building industry; there was a wholesome restatement of the objectives and methods in the industrial arts, and there was a partial clarification of ideas on the relations of the several vocational associations.

The Middle West Association owes its inception and continued prosperity to a little group of enthusiasts who have worked for years, in season and out, for its welfare.

These men have made programs, sold exhibit space, boosted local interest, and have made themselves generally useful, without asking recognition or office. This same little group may be thanked for much of the success of the St. Louis Convention. These old-timers, so-called, were present at the convention with very few exceptions. Just to mention a few will recall to the reader's mind the whole group: Bogan, McKinney, Bauersfeld, Wahlstrom, MacDonald, Bennett, Selvidge, Roberts, Smith, Cotter, Brace. In addition there were present such leaders from the east and far west as David Snedden, Arthur D. Dean, Edwin A. Lee, G. L. Swiggett, and others.

The Thursday Sessions

The general program proved to be of the "variety" type, without any one predominating or overshadowing discussion. President Greer did not strike a sympathetic note in his opening address, when he recommended the merging of the several vocational associations with the National Education Association. While in theory the N. E. A. represents all phases of education, it is a fact, and probably will continue to be a fact for some years to come, that the vocational man does not attend the summer meetings and, at the winter meetings does not get a hearing such as he deserves and such as the growing importance of his field deserves. Mr. Charles A. Bennett in his address touched upon the cooperation which is developing between the trade associations, the labor unions, and the schools, and pointed to the need of further utilization of every cooperative effort for which the school man can reach. Dr. Edwin A. Lee outlined the service of the university to vocational education through (1) the training of teachers and supervisors; (2) research; (3) service to local authorities by means of advice, literature and surveys; (4) the formation of a library. Dr. David Snedden in his characteristic rapid fire manner defined the four fundamental elements of democracy in vocational education: (1) genuineness or honesty; (2) accessibility of time, place and cost; (3) adaptability to needs, interests, and abilities of the people; and (4) universality, open to every child as a part of a fair start in life.

Dr. Snedden, Miss Mary Ruth Weeks and Arthur Dean divided honors at the annual banquet. Miss Weeks defined the limitations of mental tests; Dr. Snedden pleaded for the cultural values in vocational subjects, and Mr. Dean spoke of the social problem of vocational education.

The Friday Meetings

The early opposition to vocational work in the St. Louis schools was described in an interesting historical paper by Mr. T. E. Spencer, assistant to the superintendent of the local schools. The fight of Dr. Jas. T. Harris against advocates of the O'Fallon Institute in the sixties and against Calvin M. Woodward in the eighties, forms an important chapter in the history of manual training and vocational education. It explains many reasons for the educational situation of St. Louis of the present.

The need for teaching methods of economical selling of farm products, as well as of instructing boys in increased production, was a subject of an enlightening paper by Mr. Aaron Sapiro of the Farmers' Cooperative Association. A protest against the unreasonable use of mental tests and an argument for greater attention to human values formed the subject of a characteristic talk by Arthur Dean.

The Saturday Meeting

The more effective addresses of the week were those delivered by men who are promoting vocational education in the trades and industries. Thus one of the telling papers was that of L. S. Hawkins on Saturday morning, who pointed out the difficulty of getting apprentices in the several trades in spite of the tendency of boys to enter unskilled and semi-skilled occupations which afford immediate large returns for their daily labor. Mr. Hawkins described the work in the tile setting and printing trades, and showed that there must be an immediate improvement in apprenticeship methods adapted to the needs of small as well as large cities. He argued for cooperation between the trade unions, the employers' associations and the schools, and suggested the establishment of training centres into which boys can be brought from the small communities. He showed that at present the great bulk of men are employed in small shops and come from smaller communities. He argued for the value of a three months' preliminary course of intensive training in the common operations and principles of the trades, and for part-time instruction during and following the period of apprenticeship.

The fallacy of Pound's theories of the diminishing value of vocational education was driven home by Dr. C. A. Prosser, with facts and figures showing that there is an increased need for vocational instruction in the numerous skilled trades and that some thirteen million boys and girls, and men and women are engaged in securing vocational instruction. The bulk of these are voluntary students who understand the need and value of spending time as well as money for vocational instruction.

At the afternoon session Mr. C. S. Mitchell described the vocational training plans in use at Benton Harbor, Michigan; Mr. Lewis Gustafson spoke on the low I.Q. as a factor of vocational work; Mr. L. W. Smith spoke on the vocational work in the Joliet Township High School, and Mr. R. G. Ensign argued the time honored need for cooperation between art and industry.

Sectional Meetings

The convention demonstrated again that the industrial education men are somewhat confused in aims and methods, and have not kept pace with the men who are engaged in agricultural and commercial education. The schoolmen interested in educating for the farm. and those preparing boys and girls for commercial occupations have single track problems and definite lines of action. The industrial vocational schoolmen seem on the other hand to have such a variety of occupations and of subject matter, and such a complexity of difficulties, that they are not going forward with equal ease and certainty.

There seem to be wide differences of opinion on the means of obtaining the objectives of the industrial arts in junior high schools, and a lack of understanding of the types of courses which will be successful in meeting the objectives in senior high schools. The addresses of W. E. Roberts and C. A. Bennett were decidedly illuminating, but the discussions gave evidence of the lack of unanimity of opinion.

Two of the strong addresses of the entire week were read on Friday morning by Mr. E. L. Bowman, who is directing the theories of apprenticeship in certain of the building industries, and Mr. L. S. Hawkins, who has recently completed a course of fundamental training for tile setters.

In its business session, the association went on record as favoring further steps for cooperating with the national society, and for further developing sectional associations.

The nominating committee presented the following names for officers in 1924:

President, Lewis Gustafson, director of the David Ranken School of Mechanic Trades, St. Louis. Vice-President, William T. Bawden, director of vocational education, Tulsa, Oklahoma; Treasurer, Charles McKinney, director of agriculture, Chicago; Secretary, Leonard Wahlstrom, Chicago.

The exhibits were necessarily limited in number, but proved to be of unusual variety and interest. Except for the absence of machine tool displays there was a splendid showing of materials, equipment and books for woodworking, metal working, commercial instruction, agricultural instruction, etc.

St. Louis proved to be a splendid host to the convention, and the authorities of the city schools vied with the staff of the Ranken School of Mechanical Trades in placing their institutions at the disposal of the visitors.

NOW ARE THERE ANY QUESTIONS?

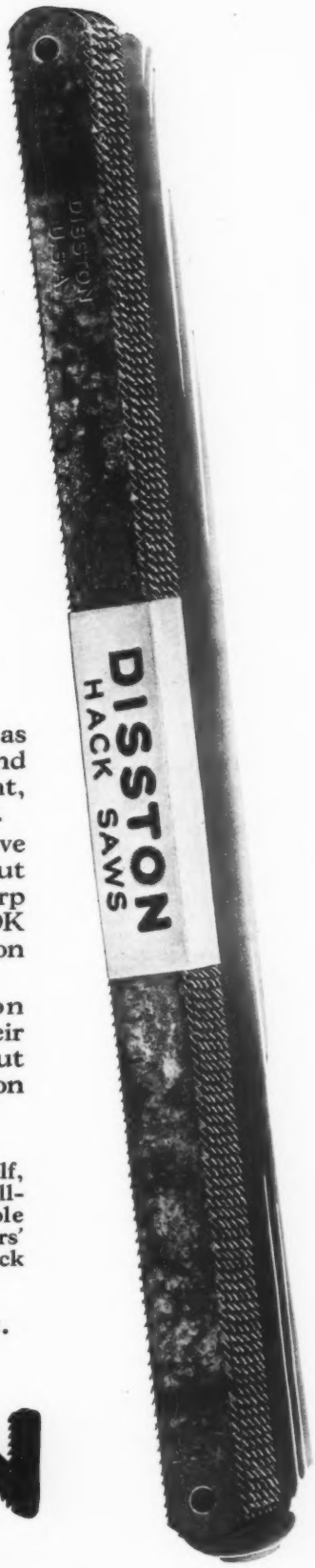
Staining Vs. Enameling Toys

421. Q: What material should I get to dye poplar wood made into toys, colors red and green? Could a mixture be prepared for dipping or will it be necessary to brush stain on.—O. W. H.

A: It is neither good commercial, or teaching, practice to stain toys in either red or green. In the factory, the materials are given a coat of weak glue sizing, allowed to dry and sanded smooth. If the glue sizing is undesirable because of swelling or warping, a shellac substitute, or cheap priming varnish is used instead. Over this, colored enamels made especially for dipping or brushing on toys, should be used. This material is handled commercially so as to give a high grade coating in one operation. It may be necessary under shop conditions to employ two coats.

If stains are desired for the toys, suitable material can be obtained by addressing manufacturers of art materials or advertisers in the INDUSTRIAL-ARTS MAGAZINE.—R. G. W.

A favorite frame for hack saws is the Disston No. 36½, adjustable by half-inches to take blades 8 to 12". Frame nickel plated; handle black.



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NEWS AND NOTES

Establish General Shop. Mr. Herman Martin, director of vocational education at Coatesville, Pa., has given some time to the establishment of the general shop in the junior high schools. These shops provide for a variety of manipulative experience which is concentrated in the one shop. Among the types of work offered are wood working, electrical work, printing, sheet metal work, cobbling, chair-caning, cement, and metal molding.

A beautifully illustrated brochure entitled "Vocational Education in Arkansas" has been issued by the state board of education of Arkansas. The work is prefaced by a "Foreword" written by A. B. Hill, state superintendent of public instruction. The text supplies information on the opportunities afforded in studies in agriculture, and home economics.

Produce Prize Designs. The local chamber of commerce, at New Britain, Conn., recently offered prizes of $5 and $3 to high school students producing the best designs having as the keynote the idea of membership. The products of the students were displayed in the store windows of local merchants.

Directory Printed by Students. The new teachers' directory at Waterbury, Conn., was set up and printed by the students of the Leavenworth High School. The entire job, from the composition and typesetting to the binding, was accomplished by the students, under the direction of the instructors.

Vocational Course in Nursing. Mr. G. W. Schefeler, director of vocational education at Marinette, Wis., has cooperated with the Marinette and Menomonee Hospital, in working out a course of training for girls in the profession of nursing. The course covers a period of three years and includes a study of the following: Preliminary and probation period, four months; medical nursing of men, women and children in medical wards, eight months; surgical nursing in surgical wards, eight months; obstetrical nursing, six months; laboratory work, two months; operating room and its equipment, four months. Five students have enrolled in the course and the work has met with unusual success during the past year.

Shop Work for High and Vocational Schools. At Marinette, Wis., shop courses in machine shop practice, pattern making, automobile mechanics, cabinet making, carpentry, printing and bench woodwork have been outlined for the vocational and high schools.

Shop Work at Topeka, Kans. The 5A boys of the Topeka schools have each made small farm wagons as part of the work of the first semester. The material was basswood, sawed to the proper width and delivered to the shops. The work of measuring, cutting, assembling and painting was done by the pupils. The wheels were made with a wheel cutter. During the progress of the work the interest of the pupils was sustained and the finished work was of a high standard.

The eighth grade pupils made electric lamps. The designs were chosen by the students and the material was either walnut, gum or salix. The frame for the shades was made of wire and soldered, while the parchment shade was designed and water-colored by the boys in the drawing classes. The completed project involved work in lines other than wood working and served to broaden the industrial knowledge of the pupils.

The manual arts equipment for the new Boswell Junior High School comprised 24 special benches with drawers, a Wallace universal bench saw, a special stain and glue bench, a paint and stain cabinet, and a drawing cabinet for instruments and equipment. The benches are equipped with complete sets of tools, while individual edge tools are provided for ninth grade classes. The general tool room contains tools needed by a class of 24 in wood working or general shop work, including an electric soldering iron, an electric glue pot, a concrete working equipment and some metal working equipment. Mr. O. J. Palmer who is in charge of the shop work, has made it a community center for a variety of boy activities.

Cement Workers Turn to Vocational School. Great strides are being made in New York City towards compelling apprentices in the several trades to enroll in the vocational schools. The latest move in that direction is an agreement between the Master League of Cement Workers and the United Cement Masons' Union whereby apprentices will be taught in the trade schools.

Agreements regulating the schooling of apprentices already exist between the advisory board and industrial

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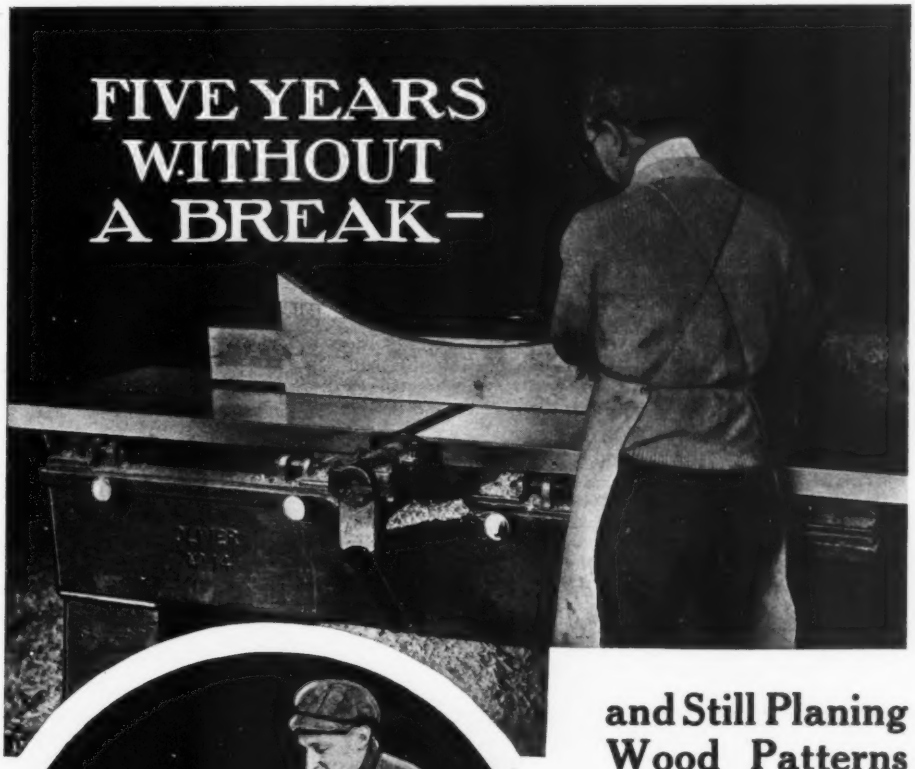

and Still Planing Wood Patterns True to Shape

"The most easily adjusted planer I have ever used" is the comment of the foreman in the Eclipse Pattern Company's (Pittsburgh, Pa.) plant where this "Oliver" Hand Planer and Jointer was photographed.

"The tables line up nicely. I'll show you." He ran a cut over a thin strip of wood and exhibited the true surface produced.

The machine has been at the disposal of about twenty-five men for over five years and they have kept it pretty busy, but no repairs have been necessary.

The "Oliver" Jointer has a wide range of usefulness in school shops as in the industrial plants. The "Oliver" Electric Jointer is a motor-arbor ball-bearing machine. Very popular and well worth investigation.

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The book was developed during years of teaching of the subject at the Michigan State Auto School and at other schools. Every chapter was submitted to the test of actual classroom use and nothing is included which is not considered vitally essential to a perfect knowledge of this subject.

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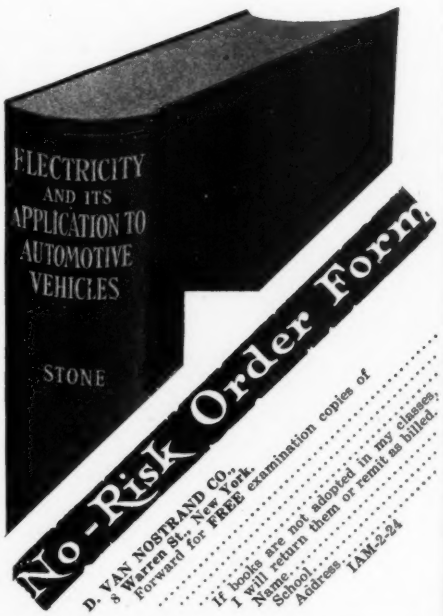

(Continued from Page XXII)

education and the public school system and the painting and decorating, carpentry, electricians, upholsterers, photo-engravers, and sheet metal workers' trades.

This ruling is compulsory on all apprentices in every case where it has been adopted. The regulations adopted by the representatives of the cement workers' trade and subsequently approved by the union, provide that employers will be required to discharge an apprentice who fails to attend school, and the defaulter will at the same time be expelled from the union. In his school work the apprentice will study not only shop practice but sketching and planning, those branches of mathematics and science, which have a bearing on his craft and, according to the apprenticeship rules, "general information."

"Shoulder to shoulder with the movement for vocational training in the building trades," says the St. Paul, Minn., Press. "should march the doctrine of all-the-year round construction. That custom of seasonal employment in the building industry is archaic. It savors of the past. It should be relegated to the junkshop, there to keep company with all the other cumbrous and outworn methods and machinery of a more primitive day. No reason exists why construction should be confined to the spring, summer and fall months, and there are many arguments in favor of winter construction."

The vocational school at Antigo, Wis., now maintains a so-called job bureau. Boys seeking employment are called upon to fill out a blank and a committee consisting of the director and four citizens assist in conducting the bureau.

Unsolved Problems in Vocational Education. Dr. Arthur Payne, professor of vocational training at Teachers College, Columbia University, recently addressed the Westchester County (N. Y.) Vocational Club in which he pointed out the fact that education included all forms of specialized education, such as law, theology, dentistry, agriculture and mining, as well as education for industry and commerce. He stated that recent experiments and tests show that the more practical forms of education have just as great educational value as the so-called academic subjects—mathematics, Latin, and so forth. These scientific tests will disprove what has been known among educators as the "discipline theory" of education—a theory which holds in part that if a pupil receives a "thorough mental discipline" through the study of languages and mathematics, and when he receives his diploma, leaves school and goes "out in the world," he will be prepared to cope with any situation. This position with regard to "academic studies" has been shown to be untenable, and that the practical studies which have a more direct bearing on the conduct and problems of life "train the mind" as well, if not better, than a foreign language or mathematics.

Vocational Agriculture. A department of Vocational Agriculture has been established at Dalhart, Tex. The department offers instruction to students in the active management of farms. The department has two rooms, one fitted with laboratory equipment and a library, and the other provided with equipment for a woodshop and blacksmith shop. Community service similar to that given by county agents is rendered by the instructor for educational purposes.

Jewelry-Making in High School. Jewelry-making has been introduced into the applied art course for girls in the high school, Central Falls, R. I., and has proven most successful under the direction of Miss Edith Williston. Each student has made ten designs for rings. The instruction covers nature drawing, design, leather work, stenciling, blue printing and basketry. Many of the articles made in class will be exhibited at the Eastern Arts Association convention, to be held in March, at Providence.

Mrs. Charles G. R. Vinal of Middletown, Conn., is to give that city a trade school building. Its upkeep will be in the hands of the state board of education. The building will be of brick or concrete and there will be 20,000 square feet of floor space available. F. J. Trinder, state director of vocational education, is in charge of the general details of the transaction.

Demonstration of House Wiring. At the mid-term promotion exercises of the Garfield Junior High School, Johnstown, Pa., a unique feature of the program consisted of a demonstration of house wiring as carried on in the school shop. A sectional piece of framework, partly wired, was

(Continued on Page XXVI)

Three Prang crayons for better results in school art

Prang Crayonex is a wax crayon with superior blending qualities, the finest that can be had for school art work. It is made of a combination of the very best waxes obtainable, and is placed on the market only after rigid laboratory tests and practical tests by both artists and teachers. Its colors are brilliant and waterproof and produce the beautiful effects of oils. It can be used equally well on paper and for stencil work on cloth. The colors can be made permanent with the use of a hot iron.

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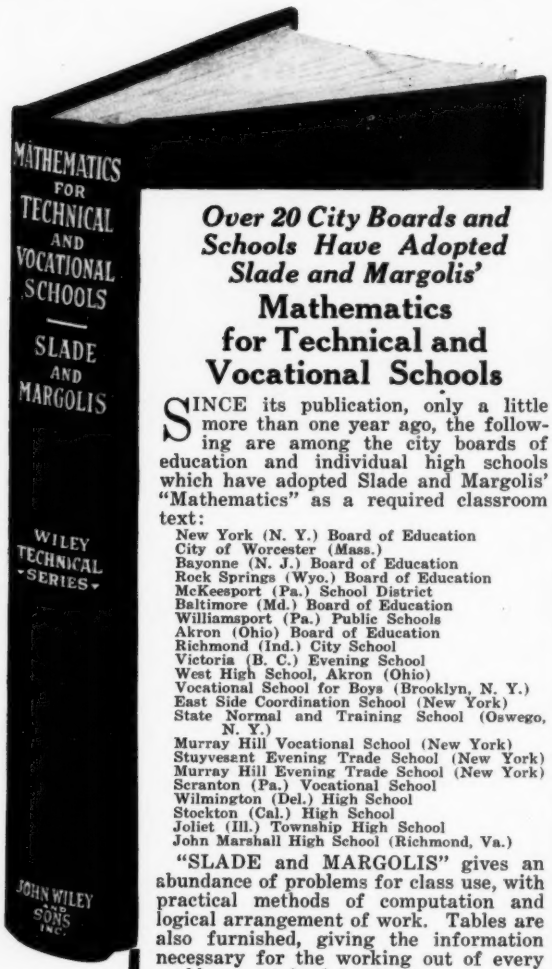

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Baltimore (Md.) Board of Education
Williamsport (Pa.) Public Schools
Akron (Ohio) Board of Education
Richmond (Ind.) City School
Victoria (B. C.) Evening School
West High School, Akron (Ohio)
Vocational School for Boys (Brooklyn, N. Y.)
East Side Coordination School (New York)
State Normal and Training School (Oswego, N. Y.)
Murray Hill Vocational School (New York)
Stuyvesant Evening Trade School (New York)
Murray Hill Evening Trade School (New York)
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IAM 3-24

(Continued from Page XXIV)

placed in position on the platform. While the job was being completed, a speaker from the class explained the steps in the job and the reasons for typical electrical trade methods. Mr. Charles E. Marks, a practical tradesman, is instructor in electrical work.

Industrial Experiments. Some interesting experiments in the use of true and false tests, completion tests, matching, comparative choice and other non-standardized efforts have recently been carried out in the industrial classes at Johnstown, Pa. The opportunity to introduce self-motivating checks is not limited to the academic field, according to Director James Killius. No phase of the school work offers so much experience which lends itself to testing.

Prevocational Class. A special prevocational class for over-age and retarded pupils has been established at the Meadowvale School, Johnstown, Pa. The class draws its membership from the entire city and from all classes below the junior high school. Miss Florence Crouse is the instructor in charge of the class.

Furniture Making Project. The vocational department of Johnstown, Pa., for the past four years has carried on an extensive furniture making scheme during the vacation season. The furniture shop operates on a regular factory basis and easily competes with the industry in the matter of cost, employment and adaptability to local needs. Equally good results were not found possible of attainment on Saturdays during the school year.

New Vocational Courses. At Albany, N. Y., evening classes in sheet metal work and electricity have been opened at the part-time school.

Household Arts Work. The school board of Westport, Mass., has set aside a part of the high school building for vocational work, principally in household arts.

Vocation Week. Vocation Week was opened at Maury High School, Norfolk, Va., with addresses on vocations by three prominent local women. Among the vocations listed in the series are law, medicine, engineering, nursing, library work, clerical work, writing, retail salesmanship, and advertising.

Better Course for Part-Time Pupils. At a recent meeting of Wisconsin directors of vocational schools, held in January, at the Milwaukee Continuation School, Milwaukee, Wis., a plea was made for a better vocational course for the pupil who must learn while he earns his living. The student should be encouraged to look upon his vocational training as educational rather than as mere labor. Improvements necessary to the work and means for increasing apprenticeship were discussed. Emphasis was laid upon the necessity of upgrading teachers through teacher-training courses and providing more versatile courses to suit the needs of working pupils.

Plan Carpenters' Classes. Steps have recently been taken by the local carpenters' association at Chanute, Kans., to organize a night school for members of the trade.

Wins Woodworking Prize. Prof. Ambrose Caliver, of Fisk University, Nashville, Tenn., recently won the first cash prize of $500 awarded by the American Woodworking Machinery Company, of Rochester, N. Y., for his essay entered in the prize contest last September. Prof. Caliver's essay was based entirely on the work he is doing at Fisk, where he has charge of the manual arts department, and consisted of an analysis of the theories on which he bases his work and a description of the methods he employs in teaching. Prof. Caliver taught at Tuskegee Institute before coming to Fisk. He holds degrees from Knoxville College and from the University of Wisconsin.

Auto Electric Class. Carnegie Institute of Technology, Pittsburgh, Pa., recently established a ten weeks' course in electric starting, lighting and ignition systems for experienced automobile mechanics.

Irvington Vocational School. The board of estimate of Essex County, New Jersey, has approved the plans for a vocational school at Irvington, to be erected at a cost of $250,000.

Study Cincinnati Industries. The school board of Cincinnati has issued a pamphlet on the metal trades industries, the third of a series on the industries of the city. It is the purpose of the board to acquaint the pupils with the local industries in order that they may be properly guided in selecting a life work after graduation.

Carpentry Apprentices' School. A vocational school for carpenters has been opened at Summit, N. J., under the direction of Mr. C. E Peterson. The school is open to apprentices and to those who desire to learn the trade.

ANNOUNCEMENT

DURING the Convention of the *National Education Association* [Department of Superintendence] to be held in CHICAGO, February 24th to 28th 1924, the headquarters of the

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OHIO INDUSTRIAL ARTS TEACHERS MEET

The Industrial Arts Department of the Ohio State Teachers' Association held its tenth annual meeting on December 27th, in the Virginia Hotel, Columbus, Ohio. The meeting was presided over by Mr. C. E. Littell, Director Industrial Training, Canton. The attendance was about forty and much interest was shown in all matters of the session.

Professor Clyde A. Bowman, Director School of Industrial Arts, Stout Institute, Menomonie, Wisconsin, presented the first paper of the morning, entitled "Analysis Devices for Relating Manual Arts and Modern Occupations."

Professor Bowman suggested, first, a graphic analysis of an occupation, and second, instruction in jobs should be through job sheets. For the latter he sugested an outline for a job sheet, and a sample job sheet. The paper was illustrated with a number of charts showing analyses of architectural drawing and home mechanics with suggestions for correlation with numerous related occupations.

Mr. Howard L. Briggs, Director of the Department of Industrial, Household, Fine and Applied Arts, in the Cleveland Public Schools, read a paper on "Some Definite Objectives in Manual Arts." Mr. Briggs called attention to the present economic tendencies in public education. He believes these tendencies are permanent and that the schools should meet them in every department. More demands are being made on the schools and everything costs more now than a few years ago.

Both these economic tendencies and the vast amount of scientific work in education carried on during the last decade or two demand that proof be shown of the value of the work of every department. Comparisons of the relative costs of academic and practical-arts subjects bring out the higher costs of the latter per pupil. At all times teachers of practical-arts work must ask themselves the question, "Is it worth the cost?"

Mr. Briggs stated that in meeting the demand for a variety of work the Cleveland schools had found the two-shop arrangement satisfactory. Men could be found prepared to teach in either the general-woodworking shop or the general-metal working shop. He preferred the name "Simple Mechanics" rather than "Household Mechanics" for the work they were doing in these shops. He suggested as an economical equipment for these general shops one or two units only for each kind of work or occupation, and he advanced the idea that wood is no longer the basic material but that metal has taken its place in a considerable degree. He stressed the importance of the junior high school in the problems of vocational guidance. Considerable vocational information may be acquired here and the ninth grade may be used for some specialization at times. But practical arts, at least up to the ninth grade, should be considered an integrating course.

At the business session which followed the paper the minutes of the previous meeting were read and approved. The President appointed a nominating committee composed of Professor G. E. McLaughlin, W. P. Pfrough, and Carl T. Cotter. The report of this committee recommending that the officers for the coming year be: President, F. C. Whitcomb, Miami University, Oxford, and Secretary-Treasurer, J. E. Boman, Finley, was unanimously adopted.

Mr. Cotter spoke of having a committee to work on standards for work in the industrial arts field. A motion was made and passed that the incoming president appoint a committee of three, of which Mr. C. E. Christy, of Cincinnati, who is the representative of the Department on the Council of the Ohio Teachers' Association, is to be a member, to work on this subject.

On motion, it was voted that a full day's session of the state association be devoted to the work of this Department and to the Department of trades and industries, each Department to have a half-day's program.

—F. C. Whitcomb, Secretary-Treasurer.

PERSONAL NEWS NOTES

Mr. Walter H. Nichol, age 38 years, instructor in cabinet making and carpentry in the vocational school at Marinette, Wis., died at his home in that city on November 30th. Mr. Nichol was a member of the faculty of the Marinette Vocational School for a number of years and was one of the pioneers in the vocational movement in the state.

Miss Grace Schermerhorn, formerly director of homemaking for the New York City schools, has been elected president of the New York State Home Economics Association.

The board of education of Memphis, Tenn., is cooperating with the contractors and bricklayers union in part-time and evening training program for apprentice bricklayers. The instruction is given at the Crockett technical high school.

Miss Josephine M. Adams has been named by the New York City board of education to the position of assistant director of home making to succeed Miss Martha Westfall, recently chosen director.

Dr. C. H. Winkler has been appointed dean of the school of vocational education of the Texas Agricultural and Mechanical College. Dr. Winkler is a native Texan who holds a number of educational degrees and who enjoys a good record in his chosen field of work.

Mr. Daniel Ward has been named as chairman of the board of trustees of the vocational school, at Paterson, N. J. Mr. Ward succeeds Mr. V. E. Royle.

Mr. F. E. Land, of Macon, Ga., state director of vocational education, has been appointed vice-president and a member of the executive council of the National Association of Vocational Education.

Mr. Henry G. Osborne has been elected president of the New York Vocational Teachers' Council, succeeding Mr. John Frenzel.

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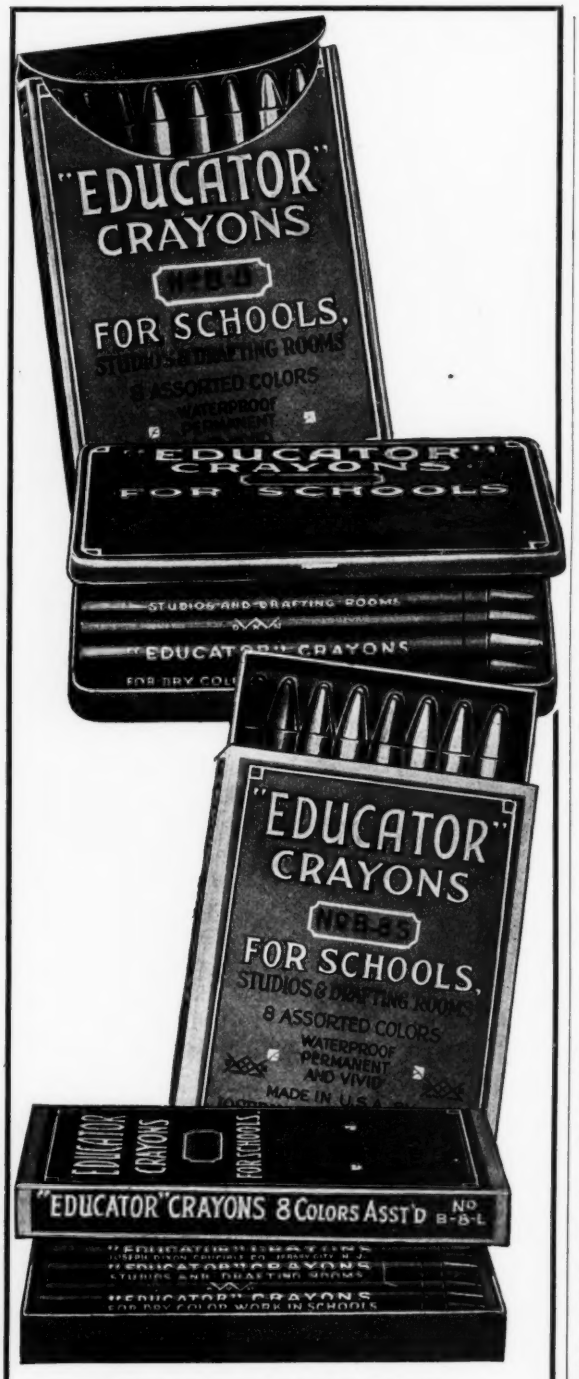

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BUYERS' NEWS
TRADE PUBLICATIONS

Chats on Period Styles in Furniture. The American Wood Working Machine Company of Rochester, New York has just prepared for free distribution a pamphlet on "Period Styles of Furniture" describing the life and the works of Thomas Chippendale. The pamphlet is extremely valuable because it presents the historic background which influenced Chippendale's monumental labors, and adds a rather complete description of the various features of Chippendale's work in both table and cabinet design. The booklet is one which every manual training and cabinet-making teacher will want to have for reference in his manual training work. The booklet is splendidly illustrated and will be sent free on request to readers of the magazine.

Announce Prize Essay Contest. Mr. Alvan T. Simonds of the Simonds Saw and Steel Co., Fitchburg, Mass., has announced the third economic prize essay contest for the promotion of the study of economics in high, normal and trade schools. Nine prizes are offered, including a first prize of $500, a second prize of $300, and seven other prizes of $100 each. The essays must be not less than 5,000 and not more than 15,000 words in length and they must be received not later than May 31, 1924.

Superior School Printing Outfits. Barnhart Brothers & Spindler have a genuine educational department and frequently surprise teachers and supervisors with novel and genuinely valuable material which aids in the organization and management of school printing classes.

Their latest contribution which has been prepared by Mr. F. C. Lampe consists of complete specifications of standard school printing outfits, for printing classes of varying sizes. The recommendations are specific and are based on three fundamental principles: (1) each outfit is selected for the best possible educational service, (2) full consideration has been given to the ability of school authorities to pay only a limited amount for outfits intended for small groups, (3) each article listed is of standard industrial type and are given in the school the same service that would be demanded of it in the commercial print shop.

The outfits include (a) body and shop type, (b) ornaments and borders, (c) spacing materials, (d) brass rule and accessories (e) wood goods, (f) tools and miscellaneous equipment, and (g) machinery and accessories.

The outfits are intended for classes of 8, 10, 15, 20, 25, 30 and 35 students. The last two sets—for 30 and 35 students—are ample for the most extensive vocational work.

Readers of the magazine may obtain the standardized list by addressing the educational department of the firm at Monroe and Throop Streets.

Industrial School Furniture. C. Christiansen, Chicago, has just issued Catalog No. 28, entitled "Industrial School Furniture." This pamphlet illustrates and describes benches and tables for manual training, domestic science, sewing and drawing, as well as a complete line of cabinet makers' benches, clamps, hand screws, vises and swing saw cut-off tables. Copies will be sent free on request to readers of the magazine.

Open New York Offices. Owing to the demand for Johnson gas appliances in New England, New York, and the middle Atlantic states the Johnson Gas Appliance Co., has opened an eastern sales and service office at 277 Lafayette Street, New York City. The new branch will carry a complete line of Johnson appliances, furnaces, hot plates, laundry stoves, etc. Sales and service men will be available for the solution of problems of users, particularly schools, institutions and industrial establishments.

Death of Mr. Albert Fink Smith. Announcement has been made of the death of Mr. Albert Fink Smith, Vice-President of the Miehle Printing Press and Manufacturing Company, on December 4th.

Mr. Smith was connected with the Philadelphia office of the Miehle Company for thirteen years and was widely known in the printing trade.

The Philadelphia office of the firm will in the future be conducted by Mr. J. E. Eddy, who was formerly at the Chicago plant, but who has been associated with Mr. Smith in Philadelphia for several years past.

NATIONAL VOCATIONAL GUIDANCE ASSOCIATION TO MEET

The annual meeting of the National Vocational Guidance Association will be held in Chicago, February 21, 22, and 23. The local arrangements are in charge of Miss Anne E. Davis, Director of Vocational Guidance, 460 South State Street, Chicago, Illinois.